

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
SPARTANBURG DIVISION

UNITED STATES OF AMERICA,

Plaintiff,

v.

ABCO INDUSTRIES, LTD.,
BASF CORPORATION, COLONIAL
HEIGHTS PACKAGING INC.,
ETHOX CHEMICALS, INC.,
EVODE-TANNER INDUSTRIES,
INC., MILLIKEN & COMPANY,
NATIONAL STARCH AND CHEMICAL
CORPORATION, AND SPECIALTY
INDUSTRIAL PRODUCTS, INC.

Defendants.

CIVIL ACTION NO.

6:92-0153-20

CONSENT DECREE

04-92-0017
04-92-0024

Medley
Farm

~~04-92-0017~~
~~04-92-0024~~



15779

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I. BACKGROUND

A. The United States of America (the "United States"), on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), filed a complaint in this matter pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606 and 9607.

B. The United States in its complaint seeks: (1) reimbursement of costs incurred by EPA and the Department of Justice for response actions at the Medley Farm Superfund Site (the "Site") in Gaffney, Cherokee County, South Carolina, together with accrued interest; (2) performance of studies and response work by the Defendants at the Site in conformity with the Record of Decision (as defined below) and the National Contingency Plan, 40 C.F.R. Part 300 (as amended) (the "NCP"); (3) a declaration of Defendants' liability for future response costs; and (4) such other relief as the Court deems appropriate.

C. In accordance with the NCP and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of South Carolina (the "State") on June 10, 1991 of negotiations with potentially responsible parties regarding the implementation of the remedial design and remedial action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to this settlement.

D. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the Department of the Interior and the

state natural resource trustees on June 10, 1991 of negotiations with potentially responsible parties regarding the release of hazardous substances that may have resulted in injury to the natural resources under federal and state trusteeship and encouraged the trustees to participate in the negotiation of this Consent Decree.

E. The Defendants that have entered into this Consent Decree (the "Settling Defendants") do not admit any liability to the Plaintiff arising out of the transactions or occurrences alleged in the complaint.

F. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on March 14, 1990, 55 Fed. Reg. 9701;

G. In response to a release or a substantial threat of a release of hazardous substances at or from the Site, certain of the Settling Defendants commenced on January 29, 1988, a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430;

H. The Settling Defendants referred to in Paragraph G above completed a Remedial Investigation ("RI") Report on February 15, 1991 and a Feasibility Study ("FS") Report on May 2, 1991. EPA approved the RI Report and the FS Report on May 30, 1991.

I. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the proposed plan for remedial action on February 12, 1991, in the Greenville News, which is a major local

newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

J. The decision by EPA on the remedial action to be implemented at the Site is embodied in a final Record of Decision (the "ROD"), executed on May 29, 1991, on which the State had a reasonable opportunity to review and comment and on which the State has given its concurrence. The ROD includes a responsiveness summary to the public comments. Notice of the final plan was published on August 21, 1991, in accordance with Section 117(b) of CERCLA.

K. Based on the information presently available to EPA, EPA believes that the Work will be properly and promptly conducted by the Settling Defendants.

L. Solely for the purposes of Section 113(j) of CERCLA, 42 U.S.C § 9613(j), the Remedial Action selected by the ROD and the Work to be performed by the Settling Defendants shall constitute a response action taken or ordered by the President.

M. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and that implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the

Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b). This Court also has personal jurisdiction over the Settling Defendants. Solely for the purposes of this Consent Decree and the underlying complaint, Settling Defendants waive all objections and defenses that they may have to jurisdiction of this Court or to venue in this District. Settling Defendants shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

III. PARTIES BOUND

2. This Consent Decree applies to and is binding upon the United States and upon Settling Defendants and their heirs, successors and assigns. Any change in ownership or corporate status of a Settling Defendant including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

3. Settling Defendants shall provide a copy of this Consent Decree to each contractor hired under a contract in an amount in excess of \$10,000 to perform a portion of the Work (as defined below) required by this Consent Decree. Settling Defendants or

their contractors shall provide written notice of this Consent Decree to each subcontractor hired under a contract in an amount in excess of \$10,000 to perform any portion of the Work required by this Consent Decree. Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance with this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

IV. DEFINITIONS

4. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meanings assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

"Consent Decree" shall mean this Decree and all appendices attached hereto. In the event of conflict between this Decree and any appendix, this Decree shall control.

"Day" shall mean a calendar day unless expressly stated to be a

working day. "Working day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

"EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

"DHEC" shall mean the South Carolina Department of Health and Environmental Control and any successor departments or agencies of the State of South Carolina.

"Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs in overseeing the Work, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Sections VII, VIII, and X, including but not limited to, attorney's fees and the amount of just compensation for access, Section XVI and Paragraph 83 of Section XXII, and the costs of reviewing or developing plans, reports and other items pursuant to this Consent Decree, verifying the Work, or otherwise implementing or enforcing this Consent Decree. Future Response Costs shall also include all costs, including direct and indirect costs, incurred by the United States in connection with the Site between July 1, 1991 and the effective date of this Consent Decree and all interest on the Past Response Costs from July 1, 1991 to the date of payment

of the Past Response Costs as set forth in Paragraph 54 of this Consent Decree.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, including, but not limited to, any amendments thereto.

"Operation and Maintenance" or "O & M" shall mean all activities required to maintain the effectiveness of the Remedial Action as required under the Operation and Maintenance Plan approved or developed by EPA pursuant to this Consent Decree, the ROD, and the Scope of Work ("SOW").

"Paragraph" shall mean a portion of this Consent Decree identified by an arabic numeral or an upper case letter.

"Parties" shall mean the United States and the Settling Defendants.

"Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs and interest, that the United States incurred with regard to the Site between June 29, 1987 and June 30, 1991.

"Performance Standards" shall mean those cleanup standards, standards of control, and other substantive requirements, criteria or limitations set forth in the ROD and the SOW and the tables attached thereto, all of which are incorporated herein by reference and any Alternative Performance Standards established pursuant to Paragraph E (Contingency Measures) of the Remedy

Components portion of the Overview of the Remedy Section of the SOW.

"Plaintiff" shall mean the United States.

"RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

"Record of Decision" or "ROD" shall mean the EPA Record of Decision relating to the Site signed on May 29, 1991, by the Regional Administrator, EPA Region IV, and all attachments thereto.

"Remedial Action" shall mean those activities, except for Operation and Maintenance, to be undertaken by the Settling Defendants to implement the final plans and specifications submitted by the Settling Defendants pursuant to the Remedial Design Work Plan and approved by EPA.

"Remedial Action Work Plan" shall mean the document submitted by the Settling Defendants pursuant to Paragraph 12.a of this Consent Decree and described more fully in Paragraph 12.b.

"Remedial Design" shall mean those activities to be undertaken by the Settling Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design Work Plan.

"Remedial Design Work Plan" shall mean the document submitted by the Settling Defendants pursuant to Paragraph 11.b of this Consent Decree and described more fully in Paragraph 11.c.

"Scope of Work" or "SOW" shall mean the scope of work for

implementation of the Remedial Design, Remedial Action, and Operation and Maintenance at the Site, as set forth in Appendix B to this Consent Decree and any modifications made in accordance with Section XXXII (Modification) of this Consent Decree.

"Section" shall mean a portion of this Consent Decree identified by a roman numeral.

"Settling Defendants" shall mean those Parties identified in Appendix D.

"Site" shall mean the Medley Farm Superfund Site, encompassing an approximately seven acre parcel of land within a 65.4 acre parcel of land owned by Ralph Medley and located off of Burnt Gin Road (Highway 72), approximately six miles south of the City of Gaffney, South Carolina, off of State Route 18, in White Plains Township, Cherokee County, South Carolina and depicted more particularly on the map attached as Appendix C.

"State" shall mean the State of South Carolina.

"Supervising Contractor" shall mean the principal contractor retained by the Settling Defendants to supervise and direct implementation of the Work under this Consent Decree.

"United States" shall mean the United States of America.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9603(27); and (3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 9603(27).

"Work" shall mean all activities Settling Defendants are

required to perform under this Consent Decree, except those required by Section XXVI (Retention of Records).

V. GENERAL PROVISIONS

5. Objectives of the Parties

The objective of the Parties in entering into this Consent Decree is to protect public health and welfare and the environment from releases or threatened releases of Waste Material from the Site. This objective shall be accomplished by the design and implementation of the Remedial Action and Operation & Maintenance at the Site by the Settling Defendants.

6. Commitments by Settling Defendants

a. Settling Defendants shall finance and perform the Work in accordance with this Consent Decree, including, but not limited to, the SOW and all plans, standards, specifications, and schedules set forth in or developed and approved by EPA pursuant to this Consent Decree. Settling Defendants shall also reimburse the United States for Past Response Costs and Future Response Costs as provided in this Consent Decree.

b. The obligations of Settling Defendants to finance and perform the Work and to pay amounts owed the United States under this Consent Decree are joint and several. In the event of the insolvency of one or more of the Settling Defendants, or the failure of any one or more Settling Defendants to implement the requirements of this Consent Decree, the remaining Settling Defendants shall complete all such requirements.

7. Compliance With Applicable Law

All activities undertaken by Settling Defendants pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the ROD and the SOW. The activities conducted pursuant to this Consent Decree, if approved by EPA, shall be considered to be consistent with the NCP.

8. Permits

a. As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.5 of the NCP, no permit shall be required for any portion of the Work conducted entirely on the Site. Where any portion of the work requires a federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. The Settling Defendants may seek relief under the provisions of Section XIX (Force Majeure) of this Consent Decree for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit required for the Work.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

VI. PERFORMANCE OF THE WORK BY SETTLING DEFENDANTS

9. Monitoring

Monitoring shall be conducted pursuant to Paragraph A (Monitoring) of the Remedy Components Section of the Overview of the Remedy Section of the SOW and shall continue until EPA has certified that the Work has been completed pursuant to Paragraph 47.b of this Consent Decree.

10. Selection of Supervising Contractor

a. All aspects of the Work to be performed by Settling Defendants pursuant to this Section VI (Performance of the Work by Settling Defendants), Section VII (Additional Response Actions), Section VIII (EPA Periodic Review), and Section IX (Quality Assurance, Sampling and Data Analysis) of this Consent Decree shall be under the direction and supervision of the Supervising Contractor, the selection of which shall be subject to disapproval by EPA. Within 10 days after the lodging of this Consent Decree, Settling Defendants shall notify EPA in writing of the name, title, and qualifications of any contractor proposed to be the Supervising Contractor. EPA will thereafter issue a notice of disapproval pursuant to Paragraph 10.b. below or an authorization to proceed. If at any time thereafter, Settling Defendants propose to change a Supervising Contractor, Settling Defendants shall give notice to EPA and shall obtain an authorization to proceed from EPA before the new Supervising Contractor performs, directs, or supervises any Work under this Consent Decree.

b. If EPA disapproves a proposed Supervising Contractor, EPA will notify Settling Defendants in writing of the disapproval and the reasons for the disapproval. Settling Defendants shall submit to EPA a list of contractors, including the qualifications of each contractor, that would be acceptable to Settling Defendants within thirty days of receipt of EPA's disapproval of the contractor previously proposed. EPA will thereafter provide written notice to Settling Defendants of the names of the contractor(s) that it disapproves and authorization to proceed with respect to any of the other contractors. Settling Defendants may select any contractor from the list of contractors that are not disapproved and shall notify EPA of the name of the contractor selected within 21 days of EPA's authorization to proceed.

c. If EPA fails to provide written notice of its authorization to proceed or disapproval as provided in this Section and this failure prevents the Settling Defendants from meeting one or more deadlines in a plan approved by the EPA pursuant to this Consent Decree, Settling Defendants may seek relief under the provisions of Section XIX (Force Majeure) hereof.

11. Remedial Design.

a. Within 45 days of the latter of (i) EPA's issuance of an authorization to proceed pursuant to Paragraph 10 and (ii) the lodging of this Consent Decree, Settling Defendants shall submit to EPA and the State a Treatability Study Work Plan (the "TSWP"),

a Health and Safety Plan and a Field Sampling and Analysis Plan (the "FSAP"), all pursuant to Paragraphs D, E and C, respectively, of Task I (Scoping and Initial Data Collection Activities) of the SOW. Upon approval of the TSWP and the FSAP by EPA, after a reasonable opportunity for review and comment by the State, and submittal of the Health and Safety Plan for all field activities to EPA and the State, Settling Defendants shall implement the TSWP and the FSAP. The Settling Defendants shall submit to EPA and the State all plans, submittals and other deliverables required under the approved TSWP and the FSAP in accordance with the approved schedule for review and approval pursuant to Section XII (Submissions Requiring Agency Approval). Unless otherwise directed by EPA, Settling Defendants shall not commence treatability studies or the field sampling and analysis activities at the Site prior to approval of the TSWP and the FSAP, as appropriate.

b. Within 60 days of the approval of all documents submitted pursuant to the TSWP and the FSAP, Settling Defendants shall submit to EPA and the State a work plan for the design of the Remedial Action at the Site (the "Remedial Design Work Plan"). The Remedial Design Work Plan shall provide a detailed approach for designing the remedy set forth in the ROD in accordance with the SOW and, upon its approval by EPA, shall be incorporated into and become enforceable under this Consent Decree.

c. The Remedial Design Work Plan shall include plans and

schedules for implementation of all remedial design and pre-design tasks identified in the SOW, including, but not limited to, plans and schedules for the completion of: (1) if determined to be necessary by EPA, a remedial design sampling and analysis plan (including, but not limited to, a Remedial Design Quality Assurance Project Plan (RD QAPP) in accordance with Section IX (Quality Assurance, Sampling and Data Analysis)); (2) the Remedial Design Project Operations Plan (RD POP)); (3) a preliminary design submittal; and (4) a prefinal/final design submittal. In addition, the Remedial Design Work Plan shall include a schedule for completion of the Remedial Design.

d. Upon approval of the Remedial Design Work Plan by EPA, after a reasonable opportunity for review and comment by the State, Settling Defendants shall implement the Remedial Design Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals and other deliverables required under the approved Remedial Design Work Plan in accordance with the approved schedule for review and approval pursuant to Section XII (Submissions Requiring Agency Approval). Unless otherwise directed by EPA, Settling Defendants shall not commence further Remedial Design activities at the Site prior to approval of the Remedial Design Work Plan.

e. The preliminary design submittal shall include, at a minimum, the following: (1) design criteria; (2) results of treatability studies; (3) results of additional field sampling; (4) project delivery strategy; (5) preliminary plans, drawings

and sketches; (6) specifications in outline form; (7) a plan for satisfying permitting requirements; and (8) preliminary construction schedule.

f. The pre-final/final design submittal shall include, at a minimum, the following: (1) final plans and specifications; (2) a final construction schedule; (3) Operation and Maintenance Plan; (4) Field Sampling Plan (directed at measuring progress towards meeting Performance Standards); and (5) Contingency Plan.

12. Remedial Action.

a. Within 45 days after the approval of the final design submittal, Settling Defendants shall submit to EPA and the State, a work plan for the performance of the Remedial Action at the Site (the "Remedial Action Work Plan"). The Remedial Action Work Plan shall provide for construction of the remedy, in accordance with the SOW, as set forth in the design plans and specifications in the approved final design submittal. Upon its approval by EPA, the Remedial Action Work Plan shall be incorporated into and become enforceable under this Consent Decree. At the same time as they submit the Remedial Action Work Plan, Settling Defendants shall submit to EPA and the State any revisions to the Site Health and Safety Plan for field activities required by the Remedial Action Work Plan.

b. The Remedial Action Work Plan shall include the following: (1) the schedule for completion of the Remedial Action; (2) the method for selection of the contractor; (3) a

schedule for developing and submitting other required Remedial Action plans (i.e., the Remedial Action Sampling and Analysis Plan (RA SAP); (4) a groundwater monitoring plan; (5) methods for satisfying permitting requirements; (6) a methodology for implementation of the Operation and Maintenance Plan; (7) a methodology for implementation of the Contingency Plan; (8) a Construction Quality Assurance Project Plan (CQAPP), which shall detail the approach to quality assurance during construction activities at the Site, shall specify an independent quality assurance team ("IQAT"), as described in the SOW, to conduct a quality assurance program during the construction phase of the project; (9) a construction quality control plan (by constructor); and (10) procedures and plans for the decontamination of equipment and the disposal of contaminated materials. The Remedial Action Work Plan also shall include a schedule for implementation of all Remedial Action tasks identified in the final design submittal and shall identify the initial formulation of the Settling Defendants' Remedial Action Project Team (which Team shall include the Supervising Contractor).

c. Upon approval of the Remedial Action Work Plan by EPA, after a reasonable opportunity for review and comment by the State, Settling Defendants shall implement the activities required under the Remedial Action Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals, or other deliverables required under the approved

Remedial Action Work Plan in accordance with the approved schedule for review and approval pursuant to Section XII (Submissions Requiring Agency Approval). Unless otherwise directed by EPA, Settling Defendants shall not commence physical on-site activities at the Site prior to approval of the Remedial Action Work Plan.

13. The Work performed by the Settling Defendants pursuant to this Consent Decree shall, at a minimum, include the obligation to achieve the Performance Standards.

14. Settling Defendants acknowledge and agree that nothing in this Consent Decree, the SOW, or the Remedial Design or Remedial Action Work Plans constitutes a warranty or representation of any kind by Plaintiff that compliance with work requirements set forth in the SOW and the Work Plans will achieve the Performance Standards. Settling Defendants' compliance with the work requirements shall not foreclose Plaintiff from seeking compliance with all terms and conditions of this Consent Decree, including, but not limited to, achieving the applicable Performance Standards.

15. Settling Defendants shall, prior to any shipment of Waste Material from the Site to any off-Site waste management facility, provide written notification to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator of such shipment of Waste Material, as required by the NCP § 300.440.

a. The Settling Defendants shall include in the written

notification the following information, where available: (1) the name and location of the facility to which the Waste Material is to be shipped; (2) the type and quantity of the Waste Material to be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. The Settling Defendants shall notify the state in which the planned receiving facility is located of any major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state will be determined by the Settling Defendants following the award of the contract for Remedial Action construction. The Settling Defendants shall provide the information required by Paragraph 15.a as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

VII. ADDITIONAL RESPONSE ACTIONS

16. In the event that EPA determines or the Settling Defendants propose that additional response actions are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD, notification of such additional response actions shall be provided to the Project Coordinator for the other party.

17. Within 30 days of receipt of notice from EPA pursuant to Paragraph 16 that additional response actions are necessary, or within such longer time as may be specified by EPA, Settling

Defendants shall submit for approval by EPA, after reasonable opportunity for review and comment by the State, a work plan for the additional response actions. The plan shall conform to the applicable requirements of Paragraphs 11 and 12. Upon approval of the plan pursuant to Section XII (Submissions Requiring Agency Approval), Settling Defendants shall implement the plan for additional response actions in accordance with the schedule contained therein.

18. Any additional response actions that Settling Defendants propose are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD shall be subject to approval by EPA, after reasonable opportunity for review and comment by the State, and, if authorized by EPA, shall be completed by Settling Defendants in accordance with plans, specifications and schedules approved by EPA pursuant to Section XII (Submissions Requiring Agency Approval).

19. Settling Defendants may invoke the procedures set forth in Section XX (Dispute Resolution) to dispute EPA's determination that additional response actions are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD. Such disputes shall be resolved pursuant to Paragraphs 63-66 of this Consent Decree.

VIII. EPA PERIODIC REVIEW

20. a. Settling Defendants shall conduct any studies and investigations as requested by EPA as necessary in order to permit EPA to conduct reviews at least every five years as

required by Section 121(c) of CERCLA, 42 U.S.C. § 9621(c).

21. If required by Sections 113(k)(2) or 117 of CERCLA, 42 U.S.C. §§ 9613(k)(2) or 9617, Settling Defendants and the public shall be provided with an opportunity to confer with EPA on any additional activities proposed by EPA during the five (5) year review process and to submit written comments for the record during the public comment period. After the period for submission of written comments is closed, the Regional Administrator, EPA Region IV, or his/her delegate, shall determine in writing if further actions are appropriate.

22. If the Regional Administrator, EPA Region IV, or his/her delegate, determines that information received, in whole or in part, during the review conducted pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), indicates that the Remedial Action is not protective of human health and the environment, the Settling Defendants shall undertake any further response actions EPA has determined are appropriate, unless their liability for such further response actions is barred by the Covenant Not to Sue set forth in Section XXII. Settling Defendants shall submit a plan for such work to EPA for approval in accordance with the procedures set forth in Section VI (Performance of the Work by Settling Defendants) and shall implement the plan approved by EPA. The Settling Defendants may invoke the procedures set forth in Section XX (Dispute Resolution) to dispute (1) EPA's determination that the remedial action is not protective of human health and the environment, (2)

EPA's selection of the further response actions ordered, or (3) EPA's determination that the Settling Defendants' liability for the further response actions requested is reserved in Paragraphs 79, 80 or 82 or otherwise not barred by the Covenant Not to Sue set forth in Section XXII. Notwithstanding any terms in this Paragraph to the contrary, EPA reserves the right to take action pursuant to Sections 104, 106 and 107 of CERCLA, 42 U.S.C. §§ 9604, 9606 and 9607.

IX. QUALITY ASSURANCE, SAMPLING, and DATA ANALYSIS

23. Settling Defendants shall use quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance and monitoring samples in accordance with EPA's "Interim Guidelines and Specifications For Preparing Quality Assurance Project Plans," December 1980, Guidance (EPA/540/G87/003 and 004); "EPA NEIC Policies and Procedures Manual," May 1978, revised November 1984, (EPA 330/9-78-001-R); and the Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, and subsequent amendments to such guidelines upon notification by EPA to Settling Defendants of such amendments. Amended guidelines shall apply only to procedures conducted after such notification. Prior to the commencement of any monitoring project under this Consent Decree, Settling Defendants shall submit to EPA for approval, after a reasonable opportunity for review and comment by the State, a Quality Assurance Project Plan ("QAPP") that is consistent with the SOW, the NCP, the above-identified guidance

and all other applicable guidance documents. If relevant to the proceeding, the Parties agree that validated sampling data generated by Settling Defendants in accordance with the QAPP(s) and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Decree. Settling Defendants shall assure that EPA personnel and EPA's authorized representatives are allowed access at reasonable times to all laboratories utilized by Settling Defendants in implementing this Consent Decree. In addition, Settling Defendants shall assure that such laboratories shall analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring. Settling Defendants shall assure that the laboratories utilized by them for the analysis of samples taken pursuant to this Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the "Contract Lab Program Statement of Work for Inorganic Analysis," and the "Contract Lab Program Statement of Work for Inorganic Analysis," dated February 1988, and any amendments made thereto during the course of implementing this Decree. Settling Defendants shall assure that all laboratories used by them for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent QA/QC program.

24. Upon request, the Settling Defendants shall allow split or duplicate samples to be taken by EPA or its authorized representatives. Settling Defendants shall notify EPA not less than 15 days in advance of any sample collection activity unless

shorter notice is agreed to in advance by EPA. In addition, EPA shall have the right to take any additional samples that EPA deems necessary. Upon request, EPA shall allow the Settling Defendants to take split or duplicate samples of any samples it takes as part of the Plaintiff's oversight of the Settling Defendants' implementation of the Work.

25. Within 7 days of a request by EPA, Settling Defendants shall provide EPA with 3 copies of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Settling Defendants with respect to the Site and/or the implementation of this Consent Decree.

26. Notwithstanding any provision of this Consent Decree, the United States hereby retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA and any other applicable statutes or regulations.

X. ACCESS

27. Commencing upon the date of lodging of this Consent Decree, the Settling Defendants agree to provide the United States and its representatives, including EPA and its contractors, with access at all reasonable times to the Site and any other property to which access is required for the implementation of this Consent Decree, to the extent access to the property is controlled by Settling Defendants, for the purposes of conducting any activity related to this Consent Decree including, but not limited to:

- a. Monitoring the Work;
- b. Verifying any data or information submitted to the United States;
- c. Conducting investigations relating to contamination at or near the Site;
- d. Obtaining samples
- e. Assessing the need for, planning, or implementing additional response actions at or near the Site;
- f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents; and
- g. Assessing Settling Defendants' compliance with this Consent Decree.

28. To the extent that the Site or any other property to which access is required for the implementation of this Consent Decree is owned or controlled by persons other than Settling Defendants, Settling Defendants shall use best efforts to secure from such persons access for Settling Defendants, as well as for the United States, the State and their representatives, including, but not limited to, EPA and its contractors, as necessary to effectuate this Consent Decree. Except for the purpose of obtaining access to property owned by Ralph C. Medley, or his successors or assigns, "best efforts" for purposes of this paragraph includes the payment of reasonable sums of money in consideration of access. If any access required to complete the Work is not obtained within 45 days of the date of entry of this Consent

Decree, or within 45 days of the date EPA notifies the Settling Defendants in writing that additional access beyond that previously secured is necessary, Settling Defendants shall promptly notify the United States, and shall include in that notification a summary of the steps Settling Defendants have taken to attempt to obtain access. The United States may, as it deems appropriate, assist Settling Defendants in obtaining access. Settling Defendants shall reimburse the United States, in accordance with the procedures set forth in Section XVII (Reimbursement of Response Costs), for all costs incurred by the United States in obtaining access, including, but not limited to, attorneys fees and any just compensation.

29. Notwithstanding any provision of this Consent Decree, the United States retains all of its access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

XI. REPORTING REQUIREMENTS

30. In addition to any other requirement of this Consent Decree, Settling Defendants shall submit to EPA one copy and to the State one copy of written monthly progress reports that: (a) describe the actions which have been taken toward achieving compliance with this Consent Decree during the previous month; (b) include a summary of all results of sampling and tests and all other data which have passed quality assurance/quality control requirements and which were received or generated by Settling Defendants or their contractors or agents in the

previous month; (c) identify all work plans, plans and other deliverables required by this Consent Decree to have been completed and submitted during the previous month; (d) describe all actions, including, but not limited to, data collection and implementation of work plans, which are scheduled for the next month and provide other information relating to the progress of construction, including, but not limited to, critical path diagrams, Gantt charts and Pert charts; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays; (f) include any modifications to the work plans or other schedules that Settling Defendants have proposed to EPA or that have been approved by EPA; and (g) describe all activities undertaken in support of the Community Relations Plan during the previous month and those to be undertaken in the next month. Settling Defendants shall submit these progress reports to EPA and the State by the 10th day of every month following the lodging of this Consent Decree until EPA notifies the Settling Defendants pursuant to Paragraph 48.b of Section XV (Certification of Completion). If requested by EPA, Settling Defendants shall also provide briefings for EPA to discuss the progress of the Work.

31. The Settling Defendants shall notify EPA of any change in the schedule described in the monthly progress reports for the performance of any activity, including, but not limited to, data

collection and implementation of work plans, no later than seven days prior to the performance of the activity.

32. a. Upon the occurrence of any event during performance of the Work that Settling Defendants are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-Know Act ("EPCRA"), Settling Defendants shall within 24 hours of the on-set of such event orally notify the EPA Project Coordinator or the Alternate EPA Project Coordinator (in the event of the unavailability of the EPA Project Coordinator), or, in the event that neither the EPA Project Coordinator or Alternate EPA Project Coordinator is available, the Emergency Response Section, Region IV, United States Environmental Protection Agency. These reporting requirements are in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304.

b. Within 20 days of the onset of such an event, Settling Defendants shall furnish to Plaintiff a written report, signed by the Settling Defendants' Project Coordinator, setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Within 30 days of the conclusion of such an event, Settling Defendants shall submit a report setting forth all actions taken in response thereto.

33. Settling Defendants shall submit to the Court, EPA and the State each year, within 30 days of the anniversary of the entry of the Consent Decree, a report setting forth the status of the Work, which shall at a minimum include a statement of major

milestones accomplished in the preceding year, a statement of tasks remaining to be accomplished, and a schedule for implementation of the remaining Work. Settling Defendants shall submit three copies of the report to EPA and three copies of the report to the State.

34. Settling Defendants shall submit the number of copies specified in the SOW of all plans, reports, and data required by the SOW, the Remedial Design Work Plan, the Remedial Action Work Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans. Settling Defendants shall simultaneously submit 3 copies of all such plans, reports and data to the State.

35. All reports and other documents submitted by Settling Defendants to EPA (other than the monthly progress reports referred to above) which purport to document Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendants.

XII. SUBMISSIONS REQUIRING AGENCY APPROVAL

36. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Decree, EPA, after reasonable opportunity for review and comment by the State, shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that the Settling Defendants modify the submission; or (e) any

combination of the above.

37. In the event of approval, approval upon conditions, or modification by EPA, pursuant to Paragraph 36(a), (b) or (c), Settling Defendants shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA subject only to the Settling Defendants' right to invoke the Dispute Resolution procedures set forth in Section XX (Dispute Resolution) with respect to the modifications or conditions made by EPA. In the event that EPA modifies an initial submission to cure any deficiencies pursuant to Paragraph 36(c), EPA shall not seek stipulated penalties, except as provided in Paragraph 40 of this Consent Decree. If EPA modifies any technical provision of a design plan or specification and the Settling Defendants' Project Coordinator disagrees with such modification, the Settling Defendants shall have the right to document such disagreement with EPA in writing and EPA will then note in such design plan or specification that EPA has modified the document.

38. a. Upon receipt of a notice of disapproval and the reason for such disapproval pursuant to Paragraph 36(d), Settling Defendants shall, within 14 days or such other time as specified by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XXI, shall accrue during the 14-day period or otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in

Paragraph 39.

b. Notwithstanding the receipt of notice of disapproval pursuant to Paragraph 36(d), Settling Defendants shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve Settling Defendants of any liability for stipulated penalties under Section XXI (Stipulated Penalties).

39. In the event that a resubmitted plan, report or other item, or portion thereof, is disapproved by EPA, EPA may again require the Settling Defendants to correct the deficiencies, in accordance with the preceding Paragraphs. EPA also retains the right to amend or develop the plan, report or other item. Settling Defendants shall implement any such plan, report, or item as amended or developed by EPA, subject only to their right to invoke procedures set forth in Section XX (Dispute Resolution).

40. If upon resubmission a plan, report, or item is disapproved or modified by EPA due to a material defect, Settling Defendants shall be deemed to have failed to submit such plan, report, or item timely and adequately unless the Settling Defendants invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution) and EPA's action is overturned pursuant to that Section. The provisions of Section XX (Dispute Resolution) and Section XXI (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any

stipulated penalties during Dispute Resolution. If EPA's disapproval, or modification of a resubmittal, is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XXI (Stipulated Penalties).

41. All plans, reports, and other items required to be submitted to EPA under this Consent Decree shall, upon approval or modification by EPA, be enforceable under this Consent Decree. In the event EPA approves or modifies a portion of a plan, report, or other item required to be submitted to EPA under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree.

XIII. PROJECT COORDINATORS

42. Within 20 days of lodging this Consent Decree, Settling Defendants and EPA will notify each other, in writing, of the name, address and telephone number of their respective designated Project Coordinators and Alternate Project Coordinators. If a Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor will be given to the other parties at least 5 working days before the changes occur, unless impracticable, but in no event later than the actual day the change is made. The Settling Defendants' Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Work. The Settling Defendants' Project Coordinator shall not be acting as an attorney for any of

the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

43. Plaintiff may designate other representatives, including, but not limited to, EPA employees, and federal contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Project Coordinator and Alternate Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager ("RPM") by the National Contingency Plan, 40 C.F.R. Part 300. In addition, EPA's Project Coordinator or Alternate Project Coordinator shall have authority, consistent with the National Contingency Plan, to halt any Work required by this Consent Decree and to take any necessary response actions when s/he determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

44. EPA's Project Coordinator and the Settling Defendants' Project Coordinator will confer at a minimum on a monthly basis.

XIV. ASSURANCE OF ABILITY TO COMPLETE WORK

45. Within 30 days of entry of this Consent Decree, Settling Defendants shall establish and maintain financial security in the amount of \$3,000,000 in one of the following forms:

- (a) A surety bond guaranteeing performance of the Work;

- (b) One or more irrevocable letters of credit equalling the total estimated cost of the Work;
- (c) A trust fund;
- (d) A guarantee to perform the Work provided by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with at least one of the Settling Defendants; or
- (e) A demonstration that one or more of the Settling Defendants satisfy the requirements of 40 C.F.R. Part 264.143(f).

46. If the Settling Defendants seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 45(d) of this Consent Decree, Settling Defendants shall demonstrate that the guarantor satisfies the requirements of 40 C.F.R. Part 264.143(f). If Settling Defendants seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guaranty, they shall resubmit sworn statements conveying the information required by 40 C.F.R. Part 264.143(f) annually, on the anniversary of the effective date of this Consent Decree. In the event that EPA determines at any time that the financial assurances provided pursuant to this paragraph are inadequate, Settling Defendants shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for approval one of the other forms of financial assurance listed in Paragraph 45

of this Consent Decree. Settling Defendants' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Consent Decree.

XV. CERTIFICATION OF COMPLETION

47. Completion of the Remedial Action.

a. Within 90 days after Settling Defendants conclude that the Remedial Action has been fully performed and the Performance Standards have been attained, Settling Defendants shall so certify to the United States and shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the Remedial Action has been fully performed and the Performance Standards have been attained, they shall submit a written report to EPA for approval pursuant to Section XII (Submissions Requiring Agency Approval) within 30 days of the inspection. In the report, a registered professional engineer and the Settling Defendants' Project Coordinator shall certify that the Remedial Action has been completed in accordance with the terms and conditions of this Consent Decree, the ROD and the SOW. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"I certify under penalty of law that this document and its attachments were prepared under my direction or supervision in

accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. I further certify under penalty of law, based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

If, after completion of the pre-certification inspection and receipt and review of the written report, EPA, after reasonable opportunity to review and comment by the State, determines that the Remedial Action or any portion thereof has not been completed in accordance with this Consent Decree or that the Performance Standards have not been achieved, EPA will notify Settling Defendants in writing of the activities that must be undertaken to complete the Remedial Action and achieve the Performance Standards. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XII (Submissions Requiring Agency Approval). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established pursuant to this Paragraph, subject to their right to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion by Settling

Defendants and after a reasonable opportunity for review and comment by the State, that the Remedial Action has been fully performed in accordance with this Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to Settling Defendants. This certification shall constitute the Certification of Completion of the Remedial Action for purposes of this Consent Decree, including, but not limited to, Section XXII (Covenants Not to Sue by Plaintiff). Certification of Completion of the Remedial Action shall not affect Settling Defendants' obligations under this Consent Decree.

48. Completion of the Work

a. Within 90 days after Settling Defendants conclude that all phases of the Work (including O & M), have been fully performed, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If after the pre-certification inspection, the Settling Defendants still believe that the Work has been fully performed, Settling Defendants shall submit a written report (the "Remedy Completion Report") by a registered professional engineer stating that the Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"I certify under penalty of law that this document and its attachments were prepared under my direction or

supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. I further certify under penalty of law, based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

If, after review of the written report, EPA, after reasonable opportunity for review and comment by the State, determines that any portion of the Work has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendants in writing of the activities that must be undertaken to complete the Work. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XII (Submissions Requiring Agency Approval). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion by Settling Defendants, and after a reasonable opportunity for review and comment by the State, that the Work has been fully performed in accordance with this Consent Decree, EPA will so notify the Settling Defendants in writing.

XVI. EMERGENCY RESPONSE

49. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from or at the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Settling Defendants shall, subject to Paragraph 50, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify EPA's Project Coordinator, or, if the Project Coordinator is unavailable, EPA's Alternate Project Coordinator. If neither of these persons is available, the Settling Defendants shall notify the EPA Emergency Response Unit, Region IV. Settling Defendants shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the Contingency Plans, and any other applicable plans or documents developed pursuant to the SOW. In the event that Settling Defendants fail to take appropriate response action as required by this Section, and EPA takes such action instead, Settling Defendants shall reimburse EPA for all costs of the response action not inconsistent with the NCP, 40 C.F.R. Part 300, pursuant to Section XVII (Reimbursement of Response Costs).

50. Nothing in the preceding Paragraph or in this Consent Decree shall be deemed to limit any authority of the United States to take, direct, or order all appropriate action or to

seek an order from the Court to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site.

XVII. REIMBURSEMENT OF RESPONSE COSTS

51. Within 30 days of the effective date of this Consent Decree, Settling Defendants shall pay to the United States \$237,287.23, in the form of a certified or cashiers check or checks made payable to "EPA Hazardous Substance Superfund," and referencing the Medley Farm CERCLA Site and DOJ Case Number 90-11-3-104A in reimbursement of Past Response Costs. The Settling Defendants shall forward the check(s) to the United States Environmental Protection Agency, Region IV, ATTENTION: Superfund Accounting, P.O. Box 100142, Atlanta, Georgia 30384 and shall send copies of the check(s) to the United States as specified in Section XXVII (Notices and Submissions).

52. Settling Defendants shall reimburse the United States for all Future Response Costs not inconsistent with the National Contingency Plan incurred by the United States. From time to time, the United States will send Settling Defendants a bill(s) requiring payment that includes EPA's certified Agency Financial Management System summary data (SPUR Report) or such other summary or accounting as certified by EPA, which includes all direct and indirect costs incurred by EPA and DOJ and their contractors. Settling Defendants shall make all payments within 30 days of Settling Defendants' receipt of each bill requiring

payment, except as otherwise provided in Paragraph 53. The Settling Defendants shall make all payments required by this Paragraph in the manner described in Paragraph 51.

53. Settling Defendants may contest payment of any Future Response Costs under Paragraph 52 if they determine that the United States has made an accounting error or if they allege that a cost item that is included represents a cost that is inconsistent with the NCP. Such objection shall be made in writing within 30 days of receipt of the bill and must be sent to the United States pursuant to Section XXVII (Notices and Submissions). Any such objections shall specifically identify the contested Future Response Costs and the basis for objection. In the event of an objection, the Settling Defendants shall within the 30 day period pay all uncontested Future Response Costs in the manner described in Paragraph 51. The Settling Defendants shall send to the United States, as provided in Section XXVII (Notices and Submissions), a copy of the transmittal letter and check paying the uncontested Future Response Costs. Within such thirty day period, the Settling Defendants shall also initiate the Dispute Resolution procedures in Section XX (Dispute Resolution). If the United States prevails in the dispute, within 30 days of the resolution of the dispute, the Settling Defendants shall pay the funds (with accrued interest) to the United States in the manner described in Paragraph 51. If the Settling Defendants prevail concerning any aspect of the contested costs, the Settling Defendants shall pay

that portion of the costs (plus associated accrued interest) for which they did not prevail to the United States in the manner described in Paragraph 51. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XX (Dispute Resolution), shall be the exclusive mechanisms for resolving disputes regarding the Settling Defendants' obligation to reimburse the United States for its Future Response Costs.

54. In the event that the payments required by paragraph 51 are not made within 30 days of the effective date of this Consent Decree or the payments required by Paragraph 52 are not made within 30 days of the Settling Defendants' receipt of the bill, Settling Defendants' shall pay interest on the unpaid balance at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607. The interest on Past Response Costs shall begin to accrue 30 days after the effective date of the Consent Decree. The interest on Future Response Costs shall begin to accrue 30 days after the Settling Defendants' receipt of the bill. Payments made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiff by virtue of Settling Defendants' failure to make timely payments under this Section.

XVIII. INDEMNIFICATION AND INSURANCE

55. The United States does not assume any liability by entering into this agreement or by virtue of any designation of Settling Defendants as EPA's authorized representatives under

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Section 104(e) of CERCLA, 42 U.S.C. § 9604(e). Settling Defendants shall indemnify, save and hold harmless the United States and its officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Further, the Settling Defendants agree to pay the United States all costs it incurs including, but not limited to, attorneys fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree. The United States shall not be held out as a party to any contract entered into by or on behalf of Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants nor any contractor shall be considered to be an agent of the United States. The Settling Defendants shall not be liable to the United States for indemnification pursuant to this Paragraph for

any injuries or damages to persons or property resulting solely from any acts or omissions of employees of the United States or its contractors, subcontractors, or any persons acting on their behalf in carrying out any activities pursuant to this Consent Decree.

56. Settling Defendants waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendants shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of the Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

57. No later than 15 days before commencing any on-site Work, Settling Defendants shall secure, and shall maintain until the first anniversary of EPA's Certification of Completion of the Remedial Action pursuant to Paragraph 48.b of Section XV (Certification of Completion) comprehensive general liability and automobile insurance with limits of \$2,000,000, combined single limit naming as insured the United States. In addition, for the

duration of this Consent Decree, Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Settling Defendants in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Settling Defendants shall provide to EPA certificates of such insurance and a copy of each insurance policy. Settling Defendants shall resubmit such certificates and copies of such policies each year on the anniversary of the effective date of this Consent Decree. If Settling Defendants demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendants need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

XIX. FORCE MAJEURE

58. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of the Settling Defendants or of any entity controlled by Settling Defendants, including, but not limited to, their contractors and subcontractors, that delays or prevents the performance of any obligation under this Consent Decree despite Settling Defendants' best efforts to fulfill the obligation. The requirements that

the Settling Defendants exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring; and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the Work or a failure to attain the Performance Standards.

59. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the Settling Defendants shall notify orally EPA's Project Coordinator or, in his or her absence, EPA's Alternate Project coordinator or, in the event both of EPA's designated representatives are unavailable, the Director of the Waste Management Division, EPA Region IV, or, in his or her absence, the EPA Response Center for Oil and Hazardous Material Spills at (404) 347-4062, within 48 hours of when Settling Defendants first knew or should have known that the event might cause delay. Within 5 working days thereafter, Settling Defendants shall provide in writing to EPA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Settling Defendants' rationale for attributing such delay to a force majeure event if

they intend to assert such a claim; and a statement as to whether, in the opinion of the Settling Defendants, such event may cause or contribute to an endangerment to public health, welfare or the environment. The Settling Defendants shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure for that event. Failure to comply with the requirements set forth above shall preclude Settling Defendants from asserting any claim of force majeure for that event. Settling Defendants shall be deemed to have notice of any circumstance of which their contractors or subcontractors had or should have had notice.

60. If EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any subsequent obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Settling Defendants in writing of its decision. If EPA agrees that the delay is attributable to a force majeure event, EPA will notify the Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

61. If the Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Settling Defendants shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Settling Defendants complied with the requirements of Paragraphs 58 and 59, above. If Settling Defendants carry this burden, the delay at issue shall be deemed not to be a violation by Settling Defendants of the affected obligation of this Consent Decree identified to EPA and the Court.

XX. DISPUTE RESOLUTION

62. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree and shall apply to all provisions of this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of the Settling Defendants that have not been disputed in accordance with this Section.

63. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of

informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless such period is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party sends the other parties a written Notice of Dispute.

64. a. In the event that the parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within 14 days after the conclusion of the informal negotiation period, Settling Defendants invoke the formal dispute resolution procedures of this Section by serving on the United States a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by the Settling Defendants. Settling Defendants' Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 65 or 66.

b. Within fourteen (14) days after receipt of Settling Defendants' Statement of Position, EPA will serve on Settling Defendants its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph

65 or 66.

c. If there is disagreement between EPA and the Settling Defendants as to whether dispute resolution should proceed under Paragraph 65 or 66, the Parties shall follow the procedures set forth in the Paragraph determined by EPA to be applicable. However, if the Settling Defendants ultimately appeal to the Court to resolve the dispute, the Court shall determine which Paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 65 and 66.

65. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation: (1) the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree; and (2) the adequacy of performance of response actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by Settling Defendants regarding the validity of the ROD or any of the ROD's provisions.

a. An administrative record of the dispute shall be maintained by EPA and shall contain all Statements of Position, including supporting documentation, submitted pursuant to this Paragraph. Where appropriate, EPA may allow submission of

supplemental Statements of Position by the Parties to the dispute, and any such decision to allow or disallow submission shall be subject to the dispute resolution provisions of this Consent Decree.

b. The Director of the Waste Management Division, EPA Region IV, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 65.a. This decision shall be binding upon the Settling Defendants subject only to the right to seek judicial review pursuant to Paragraphs 65.c and d.

c. Any administrative decision made by EPA pursuant to Paragraph 65.b shall be reviewable by this Court, provided that a notice of judicial appeal is filed by the Settling Defendants with the Court and served on all parties within 10 days of receipt of EPA's decision. The notice of judicial appeal shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to Settling Defendants' notice of judicial appeal.

d. In proceedings on any dispute governed by this Paragraph, Settling Defendants shall have the burden of demonstrating that the decision of the Waste Management Division Director is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be

on the administrative record compiled pursuant to Paragraph 65.a.

66. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of Settling Defendants' Statement of Position submitted pursuant to Paragraph 64, the Waste Management Division Director, EPA Region IV, will issue a final decision resolving the dispute. The Waste Management Division Director's decision shall be binding on the Settling Defendants unless, within 10 days of receipt of the decision, the Settling Defendants file with the Court and serve on all Parties a notice of judicial appeal setting forth the matter in dispute, the efforts made by the Parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. The United States may file a response to Settling Defendants' notice of judicial appeal.

b. Notwithstanding Paragraph L of Section I (Background) of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable provisions of law.

67. The invocation of formal dispute resolution procedures under this Section shall not of itself extend, postpone or affect in any way any obligation of the Settling Defendants under this

Consent Decree not directly in dispute unless EPA or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 75. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that the Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XXI (Stipulated Penalties) subject to the waiver provision of Paragraphs 69.a and 70.a.

XXI. STIPULATED PENALTIES

68. Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs 69 and 70 to the United States for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section XIX (Force Majeure). "Compliance" by Settling Defendants shall include completion of the activities under this Consent Decree or any work plan or other plan approved under this Consent Decree identified below in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans or other documents approved by EPA pursuant to this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

69. a. The following stipulated penalties shall be payable per violation per day to the United States for failure to submit

timely or adequate documents identified in Paragraph 69.b of this Consent Decree unless the penalties are waived at the sole discretion of EPA:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$2,000	1st through 14th days
\$3,000	15th through 45th days
\$4,000	46th day and thereafter

b. Documents

- i. The RD Work Plan
- ii. The Preliminary Design
- iii. The Prefinal/Final Design
- iv. The RA Work Plan
- v. The Operation and Maintenance Plan

70. a. The following stipulated penalties shall be payable per violation per day to the United States for failure to submit timely or adequate reports listed in Paragraph 70.b of this Consent Decree unless the penalties are waived at the sole discretion of EPA:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$1,500	1st through 14th days
\$2,500	15th through 45th days
\$3,500	46th day and thereafter

b. Documents

- i. Field Sampling and Analysis Plan (FSAP)
- ii. Health and Safety Plan
- iii. Treatability Study Work Plan
- iv. Treatability Study Evaluation Report
- v. Project Delivery Strategy
- vi. Construction Management Plan
- vii. Construction Quality Assurance Project Plan
- viii. Construction Health and Safety Plan/Contingency Plan
- ix. Prefinal Inspection Report
- x. Remedial Action Report
- xi. Performance Standards Verification Plan

xii. Remedy Completion Report

c. Stipulated penalties in the amount of \$500 per violation per day shall be payable to the United States for failure to submit timely or adequate monthly progress reports pursuant to Section XI (Reporting Requirements).

71. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

72. Following EPA's determination that Settling Defendants have failed to comply with a requirement of this Consent Decree, EPA may give Settling Defendants written notification of the same and describe the noncompliance. EPA may send the Settling Defendants a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified the Settling Defendants of a violation.

73. All penalties owed to the United States under this section shall be due and payable within 30 days of the Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Settling Defendants invoke the Dispute Resolution procedures under Section XX (Dispute Resolution). All payments under this Section shall be paid by certified or cashiers check made payable to "EPA Hazardous Substances

Superfund," shall be mailed to Superfund Accounting, P.O. Box 100142, Atlanta, Georgia 30384 and shall reference CERCLA Number TJB04D673 and DOJ Case Number 90-11-3-104A. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to the United States as provided in Section XXVII (Notices and Submissions).

74. The payment of penalties shall not alter in any way Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

75. Penalties shall continue to accrue as provided in Paragraph 71 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, accrued penalties shall be paid to EPA within 30 days of the agreement or the receipt of EPA's decision or order.

b. If the dispute is appealed to this Court and the United States prevails in whole or in part, Settling Defendants shall pay all accrued penalties determined by the Court to be owed to EPA within 60 days of receipt of the Court's decision or order, except as provided in Subparagraph C below;

c. If the District Court's decision is appealed by any of the Settling Defendants, Settling Defendants shall pay all accrued penalties determined by the District Court to be owing to the United States within 15 days of receipt of the final appellate court decision.

76. a. If Settling Defendants fail to pay stipulated penalties when due, the United States may institute proceedings to collect the penalties, as well as interest. Settling Defendants shall pay interest on the unpaid balance which shall begin to accrue on the date of demand made pursuant to Paragraph 73 at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607.

b. Nothing in this Section shall be construed as prohibiting, altering, or in any way limiting the ability of the United States to seek any other remedies or sanctions available by virtue of Settling Defendants' violation of this Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(1) of CERCLA, 42 U.S.C. § 9622(1).

77. Settling Defendants agree that no payments made under this Section shall be tax deductible for Federal tax purposes.

XXII. COVENANTS NOT TO SUE BY PLAINTIFF

78. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants under the terms of this Consent Decree, and except as specifically provided in Paragraphs 79, 80 and 82 of this Section, the United States covenants not to sue or to take administrative action against Settling Defendants pursuant to Sections 106 and 107(a) of CERCLA and Section 7003 of RCRA relating to the Site. Except with respect to future liability, these covenants not to sue shall take effect upon the receipt by EPA of the payments

required by Paragraph 51 of Section XVII (Reimbursement of Response Costs). With respect to future liability, these covenants not to sue shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph 48.b of Section XV (Certification of Completion). These covenants not to sue are conditioned upon the complete and satisfactory performance by Settling Defendants of their obligations under this Consent Decree. These covenants not to sue extend only to the Settling Defendants and do not extend to any other person.

79. United States' Pre-certification reservations.

Notwithstanding any other provisions of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants (1) to perform further response actions relating to the Site; or (2) to reimburse the United States for additional costs of response if, prior to certification of completion of the Remedial Action:

- (1) conditions at the Site, previously unknown to the United States are discovered, or
- (2) information is received, in whole or in part, after the entry of this Consent Decree,

and these previously unknown conditions or this information, together with any other relevant information, indicate that the Remedial Action is not protective of human health or the environment.

80. United States' Post-certification reservations.

Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants (1) to perform further response action relating to the Site; or (2) to reimburse the United States for additional costs of response if, subsequent to certification of completion of the Remedial Action:

(i) conditions at the Site, previously unknown to the United States, are discovered after the Certification of Completion, or

(ii) information is received, in whole or in part, after the Certification of Completion,

and these previously unknown conditions or this information indicate that the Remedial Action is not protective of human health or the environment.

81. For purposes of Paragraph 79, the information previously received by and the conditions known to the United State shall include only that information and those conditions set forth in the Record of Decision and the administrative record supporting the Record of Decision. For purposes of Paragraph 80, the information previously received by and the conditions known to EPA shall include only that information and those conditions set forth in the Record of Decision, the administrative record supporting the Record of Decision, and any information received

by EPA pursuant to the requirements of this Consent Decree prior to Certification of Completion of the Remedial Action.

82. General reservations of rights. The covenants not to sue set forth above do not pertain to any matters other than those expressly specified in Paragraph 78. The United States reserves, and this Consent Decree is without prejudice to, all rights against Settling Defendants with respect to all other matters, including but not limited to, the following:

- (1) claims based on any failure by Settling Defendants to meet any requirement of this Consent Decree;
- (2) liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site;
- (3) liability for damages for injury to, destruction of, or loss of natural resources;
- (4) liability for response costs that have been or may be incurred by any federal agencies which are trustees for natural resources and which have spent, or may in the future spend, funds relating to the Site;
- (5) criminal liability;
- (6) liability for violations of federal or state law that occur during or after implementation of the Remedial Action; and
- (7) liability for costs which the United States will incur related to the Site but which are not within the definition of Future Response Costs.

83. In the event EPA determines that Settling Defendants have failed to implement any provisions of the Work in an adequate or timely manner, EPA may perform any and all portions of the Work as EPA determines necessary. Settling Defendants may invoke the procedures set forth in Section XX (Dispute Resolution) to dispute EPA's determination that the Settling Defendants failed to implement a provision of the Work in an adequate or timely manner as arbitrary and capricious or otherwise not in accordance with law. Such dispute shall be resolved on the administrative record. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered Future Response Costs that Settling Defendants shall pay pursuant to Section XVII (Reimbursement of Response Costs).

84. Notwithstanding any other provision of this Consent Decree, the United States retains all authority and reserves all rights to take any and all response actions authorized by law.

XXIII. COVENANTS BY SETTLING DEFENDANTS

85. Settling Defendants hereby covenant not to sue and agree not to assert any claims or causes of action against the United States with respect to the Site or this Consent Decree, including, but not limited to, any direct or indirect claims for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 111, 112, or 113 or any other provision of law, any claim against any department, agency or instrumentality of the United States related to the Site, or any

claims arising out of response activities at the Site. However, the Settling Defendants reserve, and this Consent Decree is without prejudice to, actions against the United States based on negligent actions taken directly by the United States (not including oversight or approval of the Settling Defendants' plans or activities) that are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA. Nothing in this Consent Decree shall be deemed to constitute pre-authorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXIV. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

86. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights than any person not a signatory to this Consent Decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a party hereto.

87. With regard to claims for contribution against Settling Defendants for matters addressed in this Consent Decree, the Parties hereto agree that the Settling Defendants are entitled,

to such protection from contribution actions or claims as is provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2).

88. The Settling Defendants agree that with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree they will notify the United States in writing no later than 60 days prior to the initiation of such suit or claim.

89. The Settling Defendants also agree that with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree, they will notify in writing the United States within 10 days of service of the complaint on them. In addition, Settling Defendants shall notify the United States within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

90. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendants shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claimsplitting, or other defenses based upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XXII (Covenants Not to

Sue by Plaintiff).

XXV. ACCESS TO INFORMATION

91. Settling Defendants shall provide to EPA, upon request, copies of all documents and information within their possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Settling Defendants shall also make available to EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

92. a. Settling Defendants may assert business confidentiality claims covering part or all of the documents or information submitted to Plaintiff under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7) of CERCLA, and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA, or if EPA has notified Settling Defendants that the documents or information are not confidential under the standard of Section 104(e)(7) of CERCLA, the public may be given access to such documents or

information without further notice to Settling Defendants.

b. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege in lieu of providing documents, they shall provide the Plaintiff with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of this Consent Decree shall be withheld on the grounds that they are privileged.

93. No claim of confidentiality shall be made with the respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

XXVI. RETENTION OF RECORDS

94. Until 6 years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 48.b of Section XV (Certification of Completion), each Settling Defendant shall preserve and retain all records and documents in its possession

or control that relate in any manner to the performance of the Work or the liability of any person for response action conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary. Until 6 years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 48.b Section XV (Certification of Completion), Settling Defendants shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work.

95. At the conclusion of this document retention period, Settling Defendants shall notify the United States at least 90 days prior to the destruction of any such records or documents, and, upon request by the United States, Settling Defendants shall deliver any such records or documents to EPA. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege, they shall provide the plaintiff with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no document, reports or other

information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

96. Each Settling Defendant hereby certifies, individually, that it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to its potential liability regarding the Site since notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Section 104(e) and 122(e) of CERCLA and Section 3004 of RCRA.

XXVII. NOTICES AND SUBMISSIONS

97. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA, and the Settling Defendants, respectively.

As to EPA:

Director, Waste Management Division
United States Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

and

Ralph Howard
EPA Project Coordinator
United States Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

As to the State:

Richard Haynes
Project Manager
Division of Site Engineering and Screening
S.C. Department of Health and Environmental Control
2600 Bull Street
Columbia, S.C. 29201

As to the Settling Defendants:

Settling Defendants' Project Coordinator:

David G. Nichols, P.G.
RMT, Inc.
100 Verdae Blvd.
P.O. Box 16778
Greenville, S.C. 29606

Any legal notices shall also be provided to the following
counsel:

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ # 90-11-3-104A

and

Elaine G. Levine, Esq.
Office of Regional Counsel
United States Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

As to the Settling Defendants:

Mary Jane Norville, Esq.
King & Spalding
191 Peachtree Street
Atlanta, GA 30303

XXVIII. EFFECTIVE DATE

98. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

XXIX. RETENTION OF JURISDICTION

99. This Court retains jurisdiction over both the subject matter of this Consent Decree and the Settling Defendants for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XX (Dispute resolution) hereof.

XXX. APPENDICES

100. The following appendices are attached to and incorporated into this Consent Decree:

"Appendix A" is the ROD.

"Appendix B" is the SOW.

"Appendix C" is the description of the Site.

"Appendix D" is the complete list of the Settling Defendants.

XXXI. COMMUNITY RELATIONS

101. Settling Defendants shall propose to EPA the level at which they choose to participate in the community relations plan to be developed by EPA. EPA will determine the appropriate role for the Settling Defendants under the Plan. Settling Defendants shall also cooperate with EPA in providing information regarding the Work to the public. As requested by EPA, Settling Defendants shall participate in the preparation of such information for dissemination to the public and in public meetings which may be held or sponsored by EPA to explain activities at or relating to the Site.

XXXII. MODIFICATION

102. Schedules specified in this Consent Decree for completion of the Work may be modified by agreement of EPA and the Settling Defendants. All such modifications shall be made in writing.

103. No material modifications shall be made to the SOW without written notification to and written approval of the United States, Settling Defendants, and the Court. Prior to providing its approval to any modification, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification. A copy of any such modifications shall be filed with the Court. Modifications to

the SOW, the Remedial Design Work Plan, and the Remedial Action Work Plan that do not materially alter those documents may be made by written agreement between EPA, after providing the State with a reasonable opportunity to review and comment on the proposed modification, and the Settling Defendants.

104. Nothing in this Consent Decree shall be deemed to alter the Court's power to enforce, supervise or approve modifications to this Consent Decree.

XXXIII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

105. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the Consent Decree disclose facts or considerations which indicate that the Consent Decree is inappropriate, improper, or inadequate. Settling Defendants consent to the entry of this Consent Decree without further notice.

106. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

XXXIV. SIGNATORIES/SERVICE

107. Each undersigned representative of a Settling Defendant to this Consent Decree and the Assistant Attorney

General for Environment and Natural Resources of the Department of Justice certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such party to this document.

108. Each Settling Defendant hereby agrees not to oppose entry of this Consent Decree unless the United States has notified the Settling Defendants in writing that it no longer supports entry of the Consent Decree.

109. Each Settling Defendant shall identify, on the attached signature page, the name and address of an agent who is authorized to accept service of process by mail on behalf of that party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants hereby agree to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons.

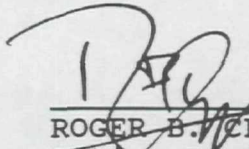
SO ORDERED THIS _____ DAY OF _____, 1991.

United States District Judge

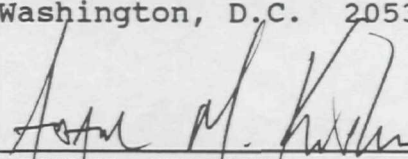
THE UNDERSIGNED PARTIES enter into this RD/RA Consent Decree in the matter of United States v. ABCO Industries, Ltd., et al., relating to the Medley Farm Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: 12-26-91

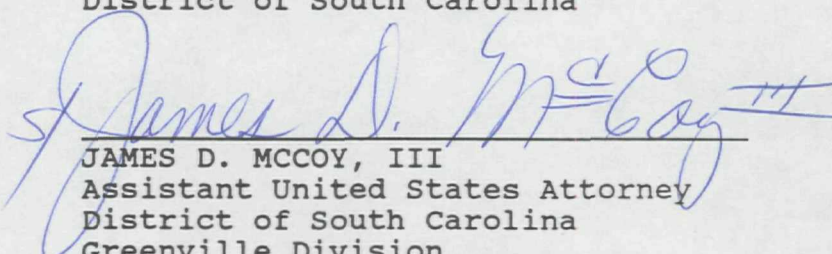


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Greer C. Tidwell

/s/ GREER C. TIDWELL
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U.S. Environmental Protection
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Elaine G. Levine

ELAINE G. LEVINE
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U.S. Environmental Protection
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Atlanta, Georgia 30365

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

ABCO Industries, Ltd.

Type name of entity

Date: October 7, 1991

By: Carl L. Bruce

Title: Vice-President

Attest:

By: Phillip L. Carpenter

Title: Outside Counsel
Celestine, Deakins, Nash, Sirock and
Stewart
(CORPORATE SEAL)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: Carl L. Bruce
Title: Vice-President
Address: ABCO Industries, Ltd.
P. O. Box 335
Roebuck, S. C. 29376

Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

BASF CORPORATION

Type name of entity

Date: November 20, 1991

By: 
Title: Attorney

Attest:

JANET CERRE
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires Jan. 29, 1995

By: 
Title: Notary

(CORPORATE SEAL)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: Carlos Leal
Title: Environmental Attorney
Address: 100 Cherry Hill Road
Parsippany, New Jersey 07054

Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

Colonial Heights Packaging Inc.
Type name of entity

Date: October 7, 1991

By: *Patricia A. Nagach*
Title: President

Attest:

By: *Diane M. McDermott*
Title: Secretary

(CORPORATE SEAL)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: Nancy K. Peterson, Esq.
Title: _____
Address: Quarles & Brady
411 East Wisconsin Ave.
Milwaukee, WI 53202

Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

GUARANTY

This Guaranty ("Guaranty") dated as of October 7, 1991 is executed by Philip Morris Incorporated (the "Guarantor") in favor of the United States of America (the "United States").

W I T N E S S E T H :

WHEREAS, a subsidiary of the Guarantor, Colonial Heights Packaging Inc. ("Colonial Heights"), is a party to that certain consent decree between the United States and certain settling defendants, including Colonial Heights, in the matter of United States v. ABCO Industries, Ltd., et al., relating to the implementation of remedial design and remedial action work at the Medley Farm Superfund Site in Gaffney, South Carolina (the "Consent Decree"); and

WHEREAS, the United States has requested that the Guarantor provide, and Guarantor has agreed to provide, a guaranty of the obligations of Colonial Heights under the Consent Decree;

NOW THEREFORE, in consideration of the premises hereof, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Guarantor hereby agrees as follows:

1. The Guarantor hereby guarantees the obligations of Colonial Heights under the Consent Decree.

2. This Guaranty shall terminate upon performance by Colonial Heights of all of its obligations under the Consent Decree.

3. The Guaranty shall be governed by New York law.

IN WITNESS WHEREOF, the Guarantor has set its name as of the date first above written.

PHILIP MORRIS INCORPORATED

By: Diane M. Middleton
Its: Assistant Secretary

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

Ethox Chemicals, Inc.

Type name of entity.

Date: 12/15/77

By: W. C. McNamee

Title: President

Attest:

By: James Patrick

Title: Notary Public for South Carolina

(CORPORATE SEAL)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name:

Gibbes & Clarkson, P.A. - John Britton

Title:

Address:

P O Box 10589

Greenville, SC 29603

Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

Evode-Tanner Industries, Inc.

Type name of entity

Date: October 7, 1991

By:

Lynn W. Ballard
Title: Vice President-Manufacturing

Attest:

By:

Eleana J. (Deke)
Title: Accountant My Commission Expires October 5, 1997

(CORPORATE SEAL)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name:

Phil Conner

Title:

Attorney

Address:

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Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

MILLIKEN & COMPANY

Type name of entity

Date: October 7, 1991

By:

Title: Vice President

Attest:

By:

Title: Vice President and

General Counsel

(CORPORATE SEAL)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name:

CT CORPORATION SYSTEM

Title:

Address:

2 Peachtree Street, N.W.

Atlanta, GA 30383

Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

NATIONAL STARCH AND CHEMICAL COMPANY
Type name of entity

Date: October 7, 1991

By: Alexander M. Samson, Jr.
Title: Counsel, Regulatory Affairs

~~WITNESS:~~ WITNESS:

By: [Signature]
~~XXXXXX~~

~~(CORPORATE SEAL)~~

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: Alexander M. Samson, Jr.
Title: Counsel, Regulatory Affairs
Address: 10 Finderne Avenue
Bridgewater, NJ 08807

Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. ABCO Industries, Ltd. et al., relating to the Medley Farm Superfund Site.

Specialty Industrial Products, Inc.
Type name of entity

Date: 2/27/92

By: Mike Flanagan
Title: V.P. General Mgr.

Attest:

By: _____
Title: _____

(CORPORATE SEAL)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: Robert D. Mowrey
Title: _____
Address: Alston & Bird
1201 West Peachtree Street
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Note: A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

APPENDIX A

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

MEDLEY FARM SUPERFUND SITE

GAFFNEY, CHEROKEE COUNTY
SOUTH CAROLINA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION
REGION IV
ATLANTA, GEORGIA

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Medley Farm
Gaffney, Cherokee County, South Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Medley Farm Superfund site in Gaffney, South Carolina chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this Site.

The State of South Carolina concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment. The principle threat at this Site results from the unacceptable elevated levels of volatile organics in the groundwater.

DESCRIPTION OF THE SELECTED REMEDY

This remedy addresses the principle threat posed by this Site. The principle threat is the contaminated groundwater emanating from beneath the Site. This remedial action will also address residual soil contamination which, if left in place, would continue to adversely impact the quality of the groundwater for 20 years.

The major components of the selected remedy include:

GROUNDWATER

- Extraction of groundwater across the entire Site that is contaminated above Maximum Contaminant Levels or non-zero Maximum Contaminant Level Goals which ever are more protective;


- On-site treatment of extracted groundwater via air stripping to remove the volatile contaminants from the water column with the need of controlling off-gas from the air-stripper to be evaluated in the Remedial Design;
- Off-site discharge of treated groundwater to Jones Creek via a National Pollution Discharge Elimination System Permit; and
- Continued analytical monitoring for contaminants in groundwater and surface water.

SOIL

- Installation of a network of air withdrawal (vacuum) wells in the unsaturated zone;
- Construction of a pump and manifold system of PVC pipes used for applying a vacuum on the air extraction wells to remove the volatile organic compounds and some semi-volatile organic compounds from the soil; and
- Implementation of an in-line water vapor removal system and an in-line vapor phase carbon adsorption system to remove organic compounds prior to releasing the extracted air to the environment.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Since this remedy may result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.



Greer C. Tidwell
Regional Administrator

MAY 29 1991

Date

THE DECISION SUMMARY
FOR THE
RECORD OF DECISION

MEDLEY FARM SUPERFUND SITE

GAFFNEY, CHEROKEE COUNTY
SOUTH CAROLINA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION
REGION IV
ATLANTA, GEORGIA

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**RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
FOR THE MEDLEY FARM SUPERFUND SITE
GAFFNEY, CHEROKEE COUNTY, SOUTH CAROLINA**

1.0 INTRODUCTION

The Medley Farm site was proposed for inclusion on the National Priority List (NPL) in June 1986 and was finalized on the NPL in March 1990. As of August 1990, the Site ranks 918 out of 1218 NPL sites with a Hazardous Ranking System (HRS) score of 31.58.

The Remedial Investigation (RI) occurred in two phases. Phase I began in January 1988 with the signing of the Administrative Order on Consent (AO) and ended with the submission of a draft RI report in March 1990. Due to data deficiencies identified in this report, the Potentially Responsible Parties (PRPs) initiated Phase II of the RI. The revised draft RI report was submitted to the Agency in November 1990 and the draft Feasibility Study (FS) was delivered in December 1990. The Agency approved both the RI and the FS in May 1991.

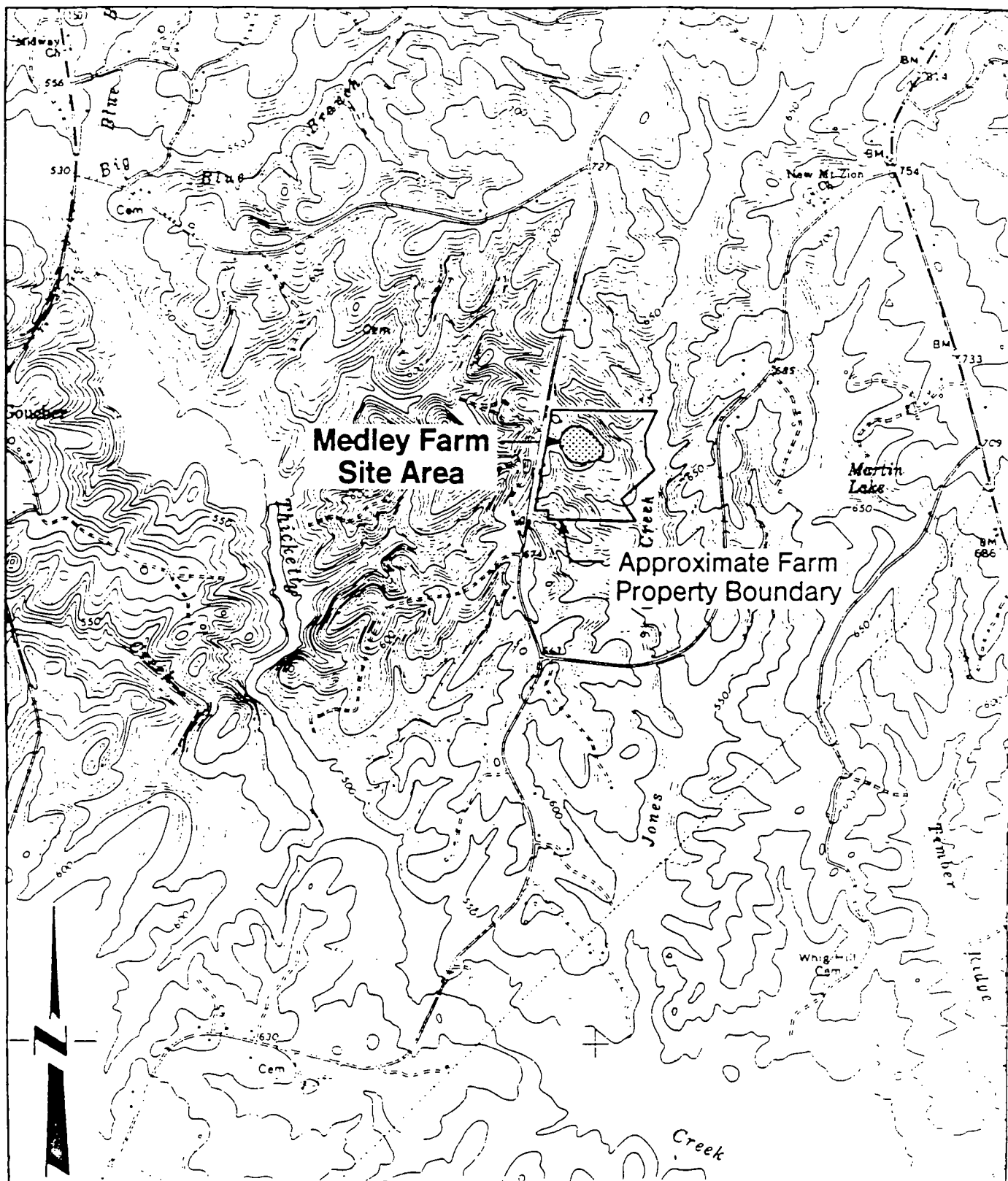
This Record of Decision (ROD) has been prepared to summarize the remedial selection process and to present the selected remedial alternative.

2.0 SITE LOCATION AND DESCRIPTION

The Medley Farm site consists of an approximately seven-acre section of the Ralph Medley Farm parcel that is situated on top of a hill. The Medley Farm property consists of 61.9 acres of rural land located approximately six miles south of Gaffney, South Carolina in Cherokee County on County Road 72 (Burnt Gin Road). Figure 1 provides the general location of the Medley Farm property and Figure 2 shows the approximate boundaries of the Medley Farm property and the Site.

The approximate center of the Site is located at latitude 34°58'54" north and longitude 81°40'02" west. The surrounding land is hilly and consists mainly of woods and pasture land. The land use in the vicinity of the Site is primarily agricultural (farms and cattle) and light residential. No change is expected in the use of the Medley Farm property in the near future. It is anticipated that Mr. Ralph Medley will maintain ownership of this property.

Ground surface elevations at the Medley Farm property range in elevation from El. 558 feet, National Geodetic Vertical Datum (NGVD), at Jones Creek, to El. 689 feet NGVD at the highest point on the property. Topography of the Site is relatively flat with slopes ranging from three to ten percent. The land surrounding the Site slopes off steeply to the east and south with slopes ranging from 10 to 52 percent. The Site is covered with weeds, briars, and small scrub trees, but the remainder of the Medley property is mostly a dense forest of hard- and softwoods. Based on observations of Site topography, surface drainage occurs to the northeast and east, to the southeast, and to



USGS Pacolet Mills Quadrangle

Scale 1:24,000

Figure 2
Approximate Boundaries of
Medley Farm Site and Farm Property

Medley Farm Site Gaffney, South Carolina

the south and southwest into two intermittent tributaries of Jones Creek. All surface drainage eventually discharges to Jones Creek which in turn flows into Thicketty Creek approximately 1.5 miles from the Medley property. Figure 3 shows the topography of the Medley Farm property, the Medley Farm site, and the surrounding area as well as the location of Jones Creek and the two intermittent tributaries. One of the tributaries is to the northeast of the Site and the other tributary is to the south.

Figure 4 shows the location of private wells within a one mile radius of the Site as well as the municipal water lines supplied by Dyratonville Water Works. All residents in the near vicinity of the Site are attached to the public water distribution system. Natural resources in the area of the Site include water, soils, flora and fauna. Jones Creek has minimal recreational value due to its size and poor accessibility. Base flow in Jones Creek near the Site is 200 gallons per minute (gpm).

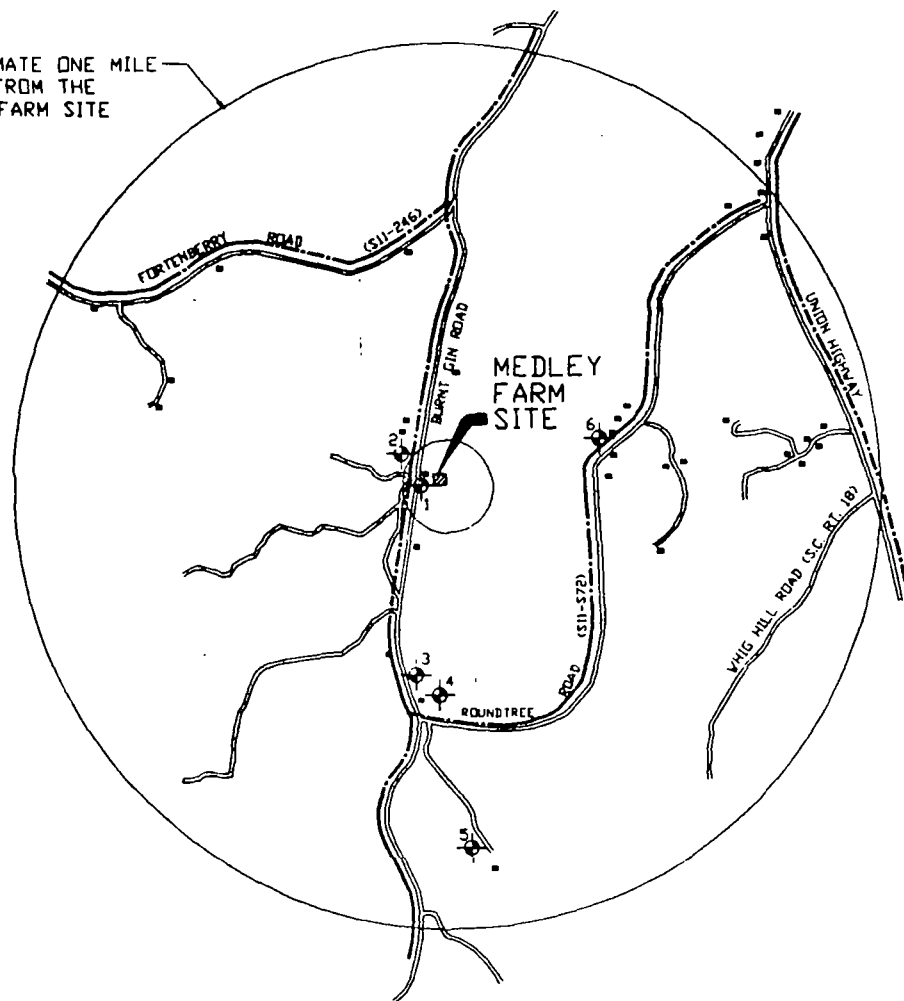
3.0 SITE HISTORY

The Medley Farm property is currently owned by Ralph C. Medley, who acquired the property from William Medley in 1948. Prior to the mid 1970's, the property was maintained as wood and pasture land. Based on available information, the disposal of drummed and other waste materials began at the Site in 1973 and was terminated in June of 1976. As a result of an anonymous call, the South Carolina Department of Health and Environmental Control (SCDHEC) visited the Site on May 3, 1983. At the time of the visit, SCDHEC estimated that approximately 2,000 55-gallon drums were on-site in scattered, random fashion. Drums were found in open pits, several small lagoons, and on the ground. These drums were in various stages of deterioration. Other notes/observations made during the May 3, 1983 SCDHEC visit included: a chemical odor in the air, a number of shallow excavations (pits) containing discolored standing water, drums standing or lying in the water in these pits, and areas of stressed vegetation. In addition to the 55-gallon drums, there were numerous plastic containers of various sizes. No formal records of disposed waste materials were maintained by the PRPs.

Based on this visit/inspection, SCDHEC returned on May 19, 1983 to collect soil samples for analysis. The results of these analyses showed the presence of a number of volatile organic compounds (VOCs) including methylene chloride, trichloroethylene (TCE), trans-1,2-dichloroethylene as well as several semivolatile organic compounds (SVOCs).

SCDHEC informed the Environmental Protection Agency (EPA) of the sampling results and EPA visited the Site during the week of May 30, 1983. During the EPA visit, additional samples were collected for analysis. Among the contaminants detected in EPA's samples were: methylene chloride, vinyl chloride, perchloroethylene (PCE), phenol, toluene, TCE, and 1,2-dichloroethane. One composite soil sample contained polychlorinated biphenyls (PCBs) at low levels.

APPROXIMATE ONE MILE
RADIUS FROM THE
MEDLEY FARM SITE



LEGEND



APPROXIMATE LOCATION OF MEDLEY FARM SITE



APPROXIMATE LOCATION OF WATER SUPPLY WELLS
ON RECORD WITH S.C. DHEC AND S.C. WRC
OWNERS OF RECORD ARE IDENTIFIED AS FOLLOWS:

- 1 RALPH MEDLEY
- 2 DOROTHY SPROUSE
- 3 JAN SARRETT
- 4 DAVIS FAMILY
- 5 ROBERT PITTMAN
- 6 ROBERT SOLESBEE



APPROXIMATE LOCATION OF MUNICIPAL
WATER SUPPLY LINES



APPROXIMATE LOCATION OF BUILDINGS
SHOWN ON USGS TOPOGRAPHIC MAP

NOTES:

1. LOCATION OF WATER SUPPLY WELLS
OBTAINED FROM THE SOUTH CAROLINA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL
CONTROL AND THE SOUTH CAROLINA WATER
RESOURCES COMMISSION BY SIRRINE, NOV. 1990.
A DOOR-TO-DOOR SURVEY WAS NOT PERFORMED
FOR THIS STUDY.

2. LOCATION OF WATER LINES SUPPLIED BY
LYRATONVILLE WATER WORKS, INC., NOV. 1990.

3. LOCATIONS OF BUILDINGS TAKEN FROM
USGS TOPOGRAPHIC MAP, PACOLET MILLS
QUADRANGLE, 1969.



SCALE IN FEET
1" = 2000 FEET

FIGURE 4
MUNICIPAL WATER SUPPLY AND
DOMESTIC WELLS IN VICINITY OF
MEDLEY FARM SITE

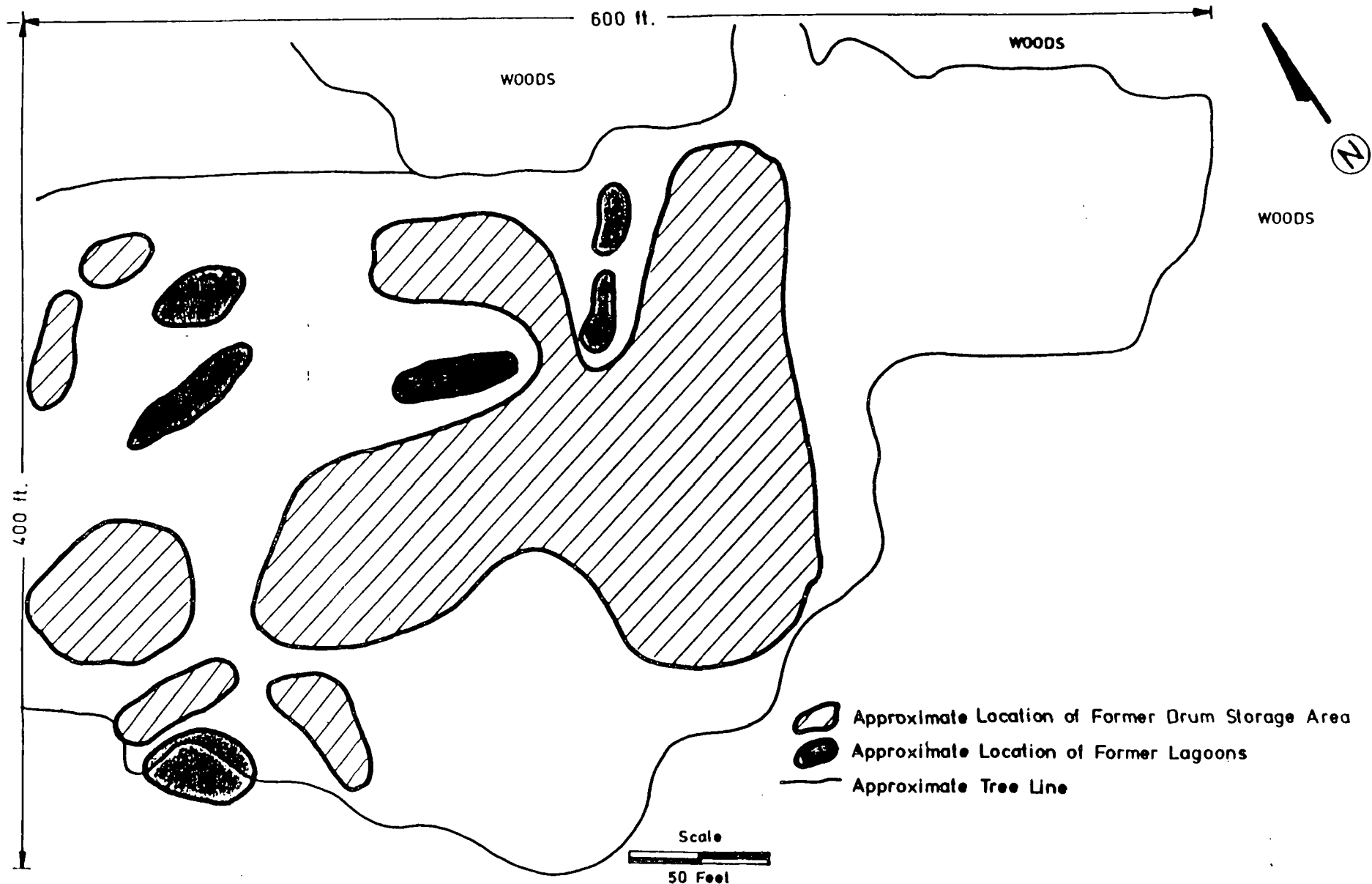
An immediate removal action was initiated on June 20, 1983 by EPA pursuant to Section 104 and other provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). A total of 5,383 55-gallon drums and 15-gallon containers were removed from the Site. These included full, partially full, and empty containers. Compatibility testing of drum contents was done prior to bulking of liquid wastes. Empty drums were crushed and taken to a sanitary landfill. The bulked liquids (24,000 gallons) were taken off-site by tanker and incinerated. The solid waste and contaminated soils, totaling 2,132 cubic yards, were taken to an approved hazardous waste landfill. Three drums containing PCBs (Arochlor 1254, 1260, and 1248) were over packed and sent to an approved disposal facility. Approximately 70,000 gallons of water were drained from the six small lagoons and treated in a pressurized sand/gravel/activated carbon filtration system for the removal of organics. The treated effluent was analyzed to ensure that it met State discharge standards prior to release into Jones Creek. The lagoons were backfilled with reportedly clean earth and graded to the natural topography. The remedial action was completed on July 21, 1983.

Analytical testing of the drum contents, as well as the water and sediment in the lagoons during the removal action, confirmed the presence of the following contaminants: toluene, benzene, methylene chloride, PCE, and vinyl chloride. Samples from adjacent homeowners' wells were collected by SCDHEC on June 27, 1983 and a trace level of methylene chloride was detected in the Sprouse well.

Following the removal action, the Agency directed one of its Contractors to conduct a geological and geophysical study. This study was completed the week of August 1, 1983. The study was designed to determine the potential of groundwater contamination at the Site. The field study included electrical resistivity soundings, a magnetometer survey, and an electromagnetic (EM) survey. Anomalous areas identified by these geophysical surveys are illustrated in Figure 5. These anomalies correlated well with the former drum storage and lagoon locations.

SCDHEC revisited the Site in April 1984 to perform a preliminary investigation and install a monitoring well. Soil samples from two boreholes and a groundwater sample collected from the newly installed monitoring well were analyzed for volatile organics, primary metals, and acid and base-neutral extractables. The results of the soil analyses showed the presence of two quantifiable VOCs at a depth of 10 feet; the VOCs are methylene chloride at 81.4 micrograms per kilogram (ug/kg) and 1,2-dichloroethane at 102 ug/kg. Results of the groundwater analysis for VOCs for samples collected in April 1984 and July 1984 are presented in Table 1. This table also provides the analytical results for groundwater samples collected from the Sprouse well.

The Medley Farm site was subsequently evaluated by the EPA in June 1985, using the HRS. A migration score of 31.58 was assigned based entirely on the groundwater route. The Site was proposed for addition to the NPL in June 1986. In March 1990, the Site was finalized on the NPL and was ranked 850 (Federal Register, March 14, 1990). As of August 1990, the Site was ranked 918 on the National Priority List (Federal Register, August 30, 1990).



Source: NUS Report on Geophysical Study TDD No. F4-8307-03

Figure 5
Medley Farm Site RI
Summary NUS Electromagnetic
Survey Results
Gaffney, South Carolina

Table 1

Medley Farm Site RI
SCDHEC Volatile Organic Ground-Water Analyses

SCDHEC MONITORING WELL ON THE MEDLEY FARM SITE:

<u>Well MD2A</u>	<u>Date of Collection</u>	
	<u>April 13, 1984 (1)</u>	<u>July 18, 1984 (2)</u>
1) methylene chloride	39.05 ug/L	9.22 ug/L
2) 1,1-dichloroethene	1,887.00 ug/L	1,645.00 ug/L
3) 1,1-dichloroethane	160.5 ug/L	43.7 ug/L
4) trans-1,2-dichloroethene	37.9 ug/L	28.0 ug/L
5) chloroform	8.0 ug/L	3.56 ug/L
6) 1,2-dichloroethane	22.05 ug/L	7.53 ug/L
7) 1,1,1-trichloroethane	3,362.00 ug/L	2,188.00 ug/L
8) carbon tetrachloride	3,804.00 ug/L	830.00 ug/L
9) trichloroethene	6.6 ug/L	3.14 ug/L
10) 1,1,2-trichloroethane	66.9 ug/L	15.3 ug/L
11) toluene	29.6 ug/L	*
12) perchloroethylene	2.5 ug/L	*

DOMESTIC WATER WELL IN MEDLEY FARM SITE VICINITY:

<u>Sprouse Well (2)</u>	<u>Date of Collection</u>		
	<u>June 27, 1983(2)</u>	<u>September 12, 1983 (2)</u>	<u>July 18, 1984 (2)</u>
1) methylene chloride	14.0	0	678 ug/L
2) 1,2-dichloroethane	*	*	2.51 ug/L

* - No value given in SCDHEC analytical results.

References: 1. Workman, 1984(a)
2. Workman, 1984(b)

4.0 ENFORCEMENT ACTIVITIES

As a result of SCDHEC's May 1983 investigation and EPA's June 1983 investigation, EPA initiated a removal action between June 1983 and July 1983. The removal action was conducted under the authority of Section 104 of CERCLA. The cost of the removal action was approximately \$675,000.

In 1983, EPA sent general notice letters, which included information requests pursuant to Section 104(e) of CERCLA to 22 companies. The vast majority of these companies were identified by drum labels found at the Site. In response to the information requests, most of the companies alleged that they had never had any contact or dealings with the Site or the owners/operators thereof and that their product drums must have been re-used by their customers without removing the labels.

In May 1985, EPA sent additional general notice and information request letter to eight parties which were identified as PRPs through interviews with the owners and operators and other witnesses.

In October 1985, EPA sent demand letters to Unisphere Chemical Corp., Milliken Chemical Company, National Starch and Chemical Company, Ralph C. Medley, Clyde Medley, and to other parties involved in this case.

In June 1986, pursuant to Section 107 of CERCLA, the United States filed a complaint in a cost recovery action against the owner of the Site, Ralph C. Medley, and the following members of his family: Clyde Medley, Grace Medley, and Barry Medley (individually and doing business as Medley Concrete Works). The complaint also named the following generators, who were believed to have shipped waste to the Site, as defendants:

1. Milliken and Company
2. National Starch and Chemical Corporation
3. Unishpere Chemical Corporation.

In a third-party complaint, the original defendants alleged that the following companies also had sent hazardous substances to the Site and were liable as generators under CERCLA Section 107, 42 U.S.C. § 9607:

1. ABCO Industries, Incorporated
2. BASF Corporation
3. Ethox Chemicals, Incorporated
4. Polymer Industries, a division of Morton-Thiokol
5. Tanner Chemical Company.

After conducting approximately six months of discovery, the United States moved for partial summary judgement on the issue of the defendants' liability. By way of an Order, dated November 5, 1986, the Court granted the government's motion for summary judgement, finding the defendants Ralph C. Medley and Clyde Medley liable for all costs incurred by the United States in responding to the release or threatened release of hazardous substances at the Site, as well as for any future response costs which the United States might incur.

After several months of negotiations, the United States and the generator defendants reached an agreement requiring the payment of \$560,000, which was approximately 83 percent of the past costs incurred by the United States in the removal action. The agreement was memorialized in a Consent Decree, dated June 30, 1987, filed with the United States District Court for the District of South Carolina, Spartanburg Division (Civil Action No. 86-252-3). The Consent Decree did not include the Medley family owner/operators.

Thereafter, the generators and the United States filed a Stipulation of Dismissal with the District Court, which provided for the dismissal of the United States' suit against the Medleys, both individually and doing business as Medley's Concrete Works, for the response costs incurred by the United States up to and including the date of entry of the Consent Decree. Since the Stipulation of Dismissal was without prejudice and it provided for the tolling of the statute of limitations, the United States preserved its ability to pursue the Medleys at a later time.

In July 1987, EPA sent special notice letters pursuant to Section 122(e) of CERCLA to initiate the moratorium period in connection with the conduct of the RI/FS to the following parties:

1. Unishpere Chemical Corporation
2. Milliken and Company
3. Tanner Chemical Company
4. Charles S. Tanner Company
5. Polymer Industries
6. National Starch and Chemical Corporation
7. Ralph C. Medley
8. Grace Medley
9. Clyde Medley
10. Barry Medley
11. Medley Concrete Works
12. Ethox Chemicals, Incorporated
13. BASF Corporation
14. ABCO.

A steering committee of PRPs was formed following the issuance of the special notice letters. The steering committee made a good faith offer to conduct the RI/FS by means of a letter to Region IV, EPA dated November 2, 1987. The parties thereafter entered into an Administrative Order by Consent, dated January 29, 1988, for conduct of the RI/FS.

5.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Information Repositories/Administrative Records for this Site were established at the Cherokee County Public Library in Gaffney and in the EPA, Region IV Regional Information Center in Atlanta, Georgia. A Community Relations Plan identifying a proactive public outreach strategy was developed at the direction of EPA Region IV staff and submitted to the information repositories prior to initiating RI field work. The following describes the community relations activities conducted by the Agency for this Site.

Two Fact Sheets were distributed to the public during the latter part of 1988. The first Fact Sheet, released in October 1988, provided pertinent background and historical information, and a brief description of the Superfund process. This Fact Sheet also informed the public that an Information Repository for the Medley Farm site had been established.

The second Fact Sheet, distributed in December 1988, described the upcoming RI field activities and provided a schedule of work. The "Kick-Off" public meeting was held on January 9, 1989. In each Fact Sheet and the "Kick-Off" meeting, the Agency highlighted the opportunities for public involvement and encouraged the public to become and remain involved with the Superfund process at the Medley Farm site.

Following the submittal of the draft RI report to the Agency by the PRPs on March 30, 1990, a third Fact Sheet was prepared. This Fact Sheet, distributed in May 1990, highlighted the findings/conclusions stated in the draft RI report. A public meeting was held on May 24, 1990 to share with the public the information presented in the draft RI and inform the public of the upcoming activities and provide a schedule for these activities.

Due to the data deficiencies identified in the draft RI report, a fourth Fact Sheet was mailed out to inform the public that a second phase, Phase II, of the RI was necessary. This Fact Sheet briefly explained why there was a need for Phase II, the field activities associated with this Phase, and a revised schedule. Following the completion of Phase II and the submittal of the revised RI report on November 30, 1990, another Fact Sheet was prepared and distributed to the public in January 1991. This Fact Sheet highlighted the findings/conclusions stated in the revised RI report. Shortly after distributing this Fact Sheet, the Proposed Plan Fact Sheet was sent out to the public on February 8, 1991. The information included in the Proposed Plan was based on the draft FS document submitted to the Agency by the PRPs on December 31, 1990.

The public was informed through the Proposed Plan Fact Sheet and a public notice released by the Agency of the February 12, 1991 Proposed Plan public meeting. The primary goals of this meeting were to review the remedial alternatives developed by the PRPs, identify the Agency's preferred alternative, provide the Agency's rationale for the selection of this alternative, encourage the public to voice their opinion with respect to the Agency's selection or any other issue, and inform the public that the public comment period on the Proposed Plan would run from February 13, 1991 to March 12, 1991. The public was also informed that all comments received during the

public comment period would be addressed in the Responsiveness Summary which is an Appendix of the ROD.

The public comment period was extended an additional 30 days in response to a request for an extension dated February 5, 1991. This extension is in accordance with the National Contingency Plan, C.F.R. § 300.430(f)(3)(i)(C). As a result of this extension, the public comment period ended on April 13, 1991. The public was informed of this extension through a public notice in a local newspaper and by means of a short Fact Sheet.

6.0 SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

The intent of this remedial action presented in this ROD is to eliminate future risks at this Site. This remedial action will remove the threat posed by contaminated groundwater at the Site and remediate residual soil contamination. Remediating residual soil contamination will prevent residual contamination from adversely impacting groundwater and decrease the future risk associated with Site soils. This is the only ROD contemplated for the Site. No other operable units have been identified at this Site.

7.0 SUMMARY OF SITE CHARACTERISTICS

The RI found that the Medley Farm site is contaminated as follows; by VOCs, SVOCs, and PCBs in surface and subsurface soils beneath the former disposal areas; and VOCs in the groundwater beneath and downgradient of the former disposal areas. No contaminants were detected above Contract Laboratory Program (CLP) Contract Required Quantification Limits (CRQLs) in surface water or sediment samples. Concentrations of inorganics detected in all environmental media were consistent with naturally occurring levels found in the vicinity of the Site as demonstrated by the analyses of background samples. Background samples were collected for surface and subsurface soils, groundwater, and surface water and sediment.

PCBs were detected at low levels in surface soils and composite samples of residual wastes and soils collected from test pits. The highest detected concentrations of PCBs at the Site were in subsurface soil samples collected from test pits 2 and 11. A concentration of 5.379 milligrams per kilogram (mg/kg) was encountered in TP-2 and 2.442 mg/kg in sample designated TP-11. The highest surface soil concentration of PCB, 1.9 mg/kg, was found at sampling location HA-8. These concentrations are below the Toxic Substances Control Act (TSCA) PCB Cleanup Policy level of 10 mg/kg or parts per million (ppm). No PCBs were detected in groundwater.

Residual source materials remaining at the Site are restricted to very small, limited areas and found only where former lagoons were once located. When found, such materials consist of thin, isolated pockets of sludges and debris.

Contaminants present in the soils represent limited areas of direct, mostly shallow disposal. Soil borings and test pits were installed to investigate suspected lagoon and drum disposal areas. The primary contaminants observed in soils at the Site are VOCs. The most significant occurrence of VOCs correlate well with former lagoon locations and areas where heavy concentrations of drums were stored (refer to Figure 5).

The total volume of contaminated soils present at the Site is approximately 53,000 cubic yards. This volume is based on the area of the Site, as defined in Figure 6, and the depth down to groundwater which is approximately 60 feet. The total volume of groundwater impacted by the former disposal activities at this Site is estimated to be 24.1 million gallons.

7.1 RESIDUAL SOURCE MATERIALS

Numerous test pits (refer to Figure 7) were excavated during the RI field work to allow for source characterization and visual observations of the underlying soil. Evidence of former lagoons were observed in test pits TP-3, TP-4, TP-5, TP-7, TP-12, and TP-14. The evidence consisted of thin, isolated pockets of sludge overlying matted vegetation, and other residual waste materials. This material was typically encountered at depths of one-half to two feet below ground surface. No other residual waste materials were encountered in the trenches excavated for source characterization except for occasional pieces of scattered debris such as plastic sheeting and rusted drum fragments.

Shallow soil samples were also collected from the test pits. These samples provided additional analytical data to help characterize the Site. Figure 7 provides the locations of the test pits, the VOCs detected in a particular test pit, and the concentration of each VOC detected. Figure 8 provides the same degree of information as does Figure 7, but for SVOCs, pesticides, and inorganics.

7.2 SOILS

Tables 2, 3, and 4 identify the organic contaminants detected in the soil at the Medley Farm site for samples collected from test pits, soil borings, and the surface. These tables also provide the concentration encountered at each sampling point. Table 2 lists the contaminants encountered in the test pits and Table 3 lists the contaminants detected in samples collected from the soil borings. Table 3 also provides the depths the samples were collected. The analytical results for contaminants found in surface soil samples are furnished in Table 4.

Table 5 lists the frequency of detection and the range of concentrations detected for contaminants found in the soil at the Medley Farm site. Those compounds listed in Table 5 which are marked with an asterisk were identified as chemicals of potential concern. A chemical of potential concern is

TABLE 2
MEDLEY FARM SITE RI
ANALYTICAL DATA SUMMARY
ORGANIC COMPOUNDS DETECTED
IN
SOILS (ug/kg)

SAMPLE ID COMPOUND	TP1-1	TP2-1	TP3-1	TP4-1	TP5-1	TP7-1	TP8-1	TP9-1	TP12-1	TP13-1	TP14-1	TP15-1
1,1-Dichloroethene			140 E	14								
1,1-Dichloroethane				47								
1,1,1-Trichloroethane				560 E								
1,1,2-Trichloroethane				71								
1,1,2,2-Tetrachloroethane				3400 E								
1,2-Dichloroethane									90			
1,2-Dichloroethene (total)			12000 E	730 E							250	
2-Butanone				81			1000					
4-Methyl-2-pentanone				16			390					
Acetone	12			2300 E			870	580 DE				
Benzene			600 E	160								
Carbon Disulfide			450 E									
Chlorobenzene			2500 E	360 E								
Ethylbenzene			1200 E	110							70	
Methylene Chloride				800 E						24	31	
Styrene				110								
Tetrachloroethene (PCE)			61000 E	5400 E					3 J		10	
Toluene			12000 E	1300 E							15	
Trichloroethene			12000 E	6600 E	8	280 D			31			16
Vinyl Acetate				13								
Vinyl Chloride			500 E								69	
Xylene (Total)		3.7	3900 E	620 E			170				250	

Data Flags:

D- Sample diluted for this analyte.

E- Estimated result. Analyte concentration exceeded the instrument calibration range.

Notes:

No volatile organic compounds were detected in soil samples collected from test pits TP6, TP10, TP11, and TP16.

TABLE 2 (continued)
 MEDLEY FARM SITE RI
 ANALYTICAL DATA SUMMARY
 ORGANIC COMPOUNDS DETECTED
 IN
 SOILS (ug/kg)

SAMPLE ID COMPOUND	TP2-1	TP3-1	TP4-1	TP5-1	TP7-1
2-Methylnaphthalene	550				
1,2,4-Trichlorobenzene		710000 D	240000 D		
Acenaphthalene			75000		
Phenol			94000 D		
Bis(2-Ethylhexyl)phthalate				161000	630

Data Flags:

D - Sample diluted for this analyte.

Notes:

No semi-volatile organic compounds were detected in soil samples collected from test pits TP1 and TP9.

Soil samples collected from test pits TP6 and TP8 were not analyzed for semi-volatile organic compounds.

TABLE 3
MEDLEY FARM SITE RI
ANALYTICAL DATA SUMMARY
ORGANIC COMPOUNDS DETECTED
IN
SOILS (ug/kg)

1,1,2,2-TETRACHLOROETHANE

Sample Depth	Soil Boring Number		
	SB2	SB5	SB6
5 - 7'	*	nd	6
10 - 12'	710 D	nd	*
15 - 17'	97 D	9	nd
25 - 27'	74 D	nd	nd

METHYLENE CHLORIDE

Sample Depth	Soil Boring Number	
	SB3	SB4
5 - 7'	*	*
10 - 12'	50	10
15 - 17'	nd	32
25 - 27'	nd	17

CHLOROFORM

Sample Depth	Soil Boring Number	
	SB2	SB6
5 - 7'	*	13
10 - 12'	600 D	*
15 - 17'	nd	nd
25 - 27'	nd	nd

TRICHLOROETHENE

Sample Depth	Soil Boring Number	
	SB4	SB7
5 - 7'	*	24
10 - 12'	19	*
15 - 17'	32	nd
25 - 27'	17	nd

1,2-DICHLOROETHANE

Sample Depth	Soil Boring Number			
	SB4	SB7	SB9	SB10
5 - 7'	*	97	*	23
10 - 12'	3700 D	*	47	*
15 - 17'	4500 D	nd	32	nd
25 - 27'	680 D	nd	99	nd

Data Flags:

D- Sample diluted for this analyte.

E - Estimated result. Analyte concentration exceeded the instrument calibration range.

Notes:

nd - Not detected

* - Not analyzed.

2-Butanone was detected in boring SB2 at 15 - 17' at 90 ug/kg in the diluted sample.

1,2-Dichloroethene (total) was detected in boring SB3 at 10 - 12' at 17 ug/kg.

PCE was detected in boring SB7 at 5 - 7' at 12 ug/kg.

Results are reported only for borings in which analytes were detected. Complete tables of analytical results are provided in Appendix L.

TABLE 3 (continued)
MEDLEY FARM SITE RI
ANALYTICAL DATA SUMMARY
ORGANIC COMPOUNDS DETECTED
IN
SOIL (ug/kg)

ACETONE

Sample Depth	Soil Boring Number			
	SB2	SB3	SB4	SB5
5 - 7'	.	.	.	nd
10 - 12'	18000 DE	140	200	21
15 - 17'	7300 DE	55	1900 D	570 D
25 - 27'	750 D	16	100	nd

ACETONE (continued)

Sample Depth	Soil Boring Number				
	SB6	SB7	SB8	SB9	SB10
5 - 7'	58	4700 D	86	.	31
10 - 12'	.	.	.	94	4
15 - 17'	nd	120	58	110	40
25 - 27'	nd	18	250 D	nd	65

Data Flags:

D - Sample diluted for this analyte.

E - Estimated result. Analyte concentration exceeded the instrument calibration range.

Notes:

nd - Not detected

. - Not analyzed

2-Butanone was detected in boring SB2 at 15 - 17' at 90 ug/kg in the diluted sample.

1,2-Dichloroethene (total) was detected in boring SB3 at 10 - 12' at 17 ug/kg.

PCE was detected in boring SB7 at 5 - 7' at 12 ug/kg.

Results are reported only for borings in which analytes were detected. Complete tables of analytical results are provided in Appendix L.

TABLE 3 (continued)
MEDLEY FARM SITE RI
ANALYTICAL DATA SUMMARY
ORGANIC COMPOUNDS DETECTED
IN
SOIL (ug/kg)

1,2-DICHLOROBENZENE

Sample Depth	Soil Boring Number SB3
5 - 7'	*
10 - 12'	nd
15 - 17'	460
25 -27'	nd

NAPHTHALENE

Sample Depth	Soil Boring Number SB3
5 - 7'	*
10 - 12'	nd
15 - 17'	410
25 -27'	nd

PHENOL

Sample Depth	Soil Boring Number SB2
5 - 7'	*
10 - 12'	77000
15 - 17'	nd
25 -27'	690

1,4-DICHLOROBENZENE

Sample Depth	Soil Boring Number SB3
5 - 7'	*
10 - 12'	nd
15 - 17'	2300
25 -27'	nd

DIETHYLPHTHALATE

Sample Depth	Soil Boring Number SB3
5 - 7'	*
10 - 12'	nd
15 - 17'	nd
25 -27'	3200

BENZOIC ACID

Sample Depth	Soil Boring Number SB2
5 - 7'	*
10 - 12'	nd
15 - 17'	nd
25 -27'	2600

1,2,4-TRICHLOROBENZENE

Sample Depth	Soil Boring Number	
	SB2	SB3
5 - 7'	*	*
10 - 12'	nd	700
15 - 17'	nd	12000
25 -27'	5200	nd

Notes:

- nd - Not detected
- * - Not analyzed

Results are reported only for borings in which analytes were detected.
Complete tables of analytical results are provided in Appendix L.

TABLE 4
MEDLEY FARM SITE RI
ANALYTICAL DATA SUMMARY
ORGANIC COMPOUNDS DETECTED
IN
SOILS (ug/kg) - See Note

SAMPLE I.D.	HA-1	HA-2	HA-3	HA-4	HA-5	HA-6	HA-7	HA-11	HA-6
PARAMETER									
1,1,2,2-Tetrachloroethane						91			85
1,1,2-Trichloroethane						160			110
1,2-Dichloroethene (total)	170	11		6			120		200
1,2-Dichloropropane							21		
Ethylbenzene				7				33	
Methylene chloride					6		23		
Styrene								11	
Tetrachloroethene					37	69			53
Trichloroethene	14					50	7		70
Vinyl chloride		25	25	28	210				

SAMPLE LOCATION	HA1	HA3	HA8	HA11
SAMPLE I.D.	HA1-2	HA3-2	HA8-2	HA11-2
PARAMETER				
Toxaphene	330			
PCB-1254		200	1900	430

SAMPLE I.D.	HA-6	HA-6 DILUTION	HA-11
PARAMETER			
1,2,4-Trichlorobenzene	990 @	1100 DJ	1200 @
bis(2-Ethylhexyl)phthalate	29000 E	33000 D	
Butylbenzylphthalate	900 @	1100 DJ	
Di-n-butylphthalate	930 @	1100 DJ	
Di-n-octylphthalate	5400	4900 D@	

Notes:

D - Sample diluted for this analyte.

J - Estimated result. Analyte detected at less than the sample quantitation limit.

E - Estimated result. Analyte concentration exceeded the instrument calibration range.

@ - Estimated result less than 5 times the detection limit.

TABLE 5

CHEMICALS DETECTED IN SURFACE SOIL
MEDLEY FARM SITE

Chemical	Frequency of Detection	Contract Required Quantitation Limit (ug/kg)	Range of Detected Concentrations (ug/kg) ^(c)
<u>Volatile Organic Compounds^(a)</u>			
*1,1,2-Trichloroethane	2/13	5	110-160
*1,1,2,2-Tetrachloroethane	2/13	5	85-91
*1,2-Dichloroethene (total)	6/13	5	4-200
*1,2-Dichloropropane	1/13	5	21
Chlorobenzene	1/13	5	3
Chloroform	1/13	5	3
*Ethylbenzene	2/13	5	7-33
*Methylene Chloride	11/13	5	2-23
*Styrene	2/13	5	3-11
*Tetrachloroethene	4/13	5	5-69
Toluene	1/13	5	1
*Trichloroethene	4/13	5	7-70
*Vinyl Chloride	4/13	10	25-210
<u>Semi-Volatile Organic Compounds^(b)</u>			
1,2-Dichlorobenzene	2/15	330	190-200
*1,2,4-Trichlorobenzene	4/15	330	810-1200
2-Methylnaphthalene	2/15	330	140-160
*Butylbenzylphthalate	5/15	330	140-1100

TABLE 5 (Cont'd)

CHEMICALS DETECTED IN SURFACE SOIL
MEDLEY FARM SITE

*Di-n-butylphthalate	4/15	330	78-1100
*Di-n-octylphthalate	4/15	330	3600-5400
Diethylphthalate	1/15	330	110
*bis(2-Ethylhexyl)phthalate	6/15	330	82-33,000
<u>Pesticides/PCB</u>			
*Toxaphene	2/13	160	330-520(d)
*PCB-1254	3/13	160	200-1900

* Chemical of potential concern

(a) Volatile organic compounds and pesticides/PCB are based on data from the following samples: HA-1 thru HA-12, and HA-6-A.

(b) Semi-volatile organic compounds are based on data from the following samples: HA-1 thru HA-12, HA-6-A, HA-16, and HA-16-A.

(c) The range of detected concentrations include estimated results (chemical concentrations less than the contract-required quantitation limit).

(d) Duplicate samples taken at same location.

defined as any chemical detected at or above the CRQL at least once in a given environmental medium. As stated above, concentrations of inorganics detected in on-site soil samples were consistent with naturally occurring levels.

7.2.1 Surface Soils

VOCs and SVOCs were detected in surface soil samples. Figure 9 shows the locations where the surface soil samples were collected. This figure also lists the contaminants identified at each sampling location as well as the concentration of each identified contaminant.

PCBs were detected in several surface soil samples. These samples, with one exception, are considered to be essentially within the limits of the former disposal or drum storage areas at the Site. HA-11, the exception, was collected from an area which receives sediment runoff from the Site via erosion. Figure 10 shows the location and lists the associated concentration of PCBs found at the Site.

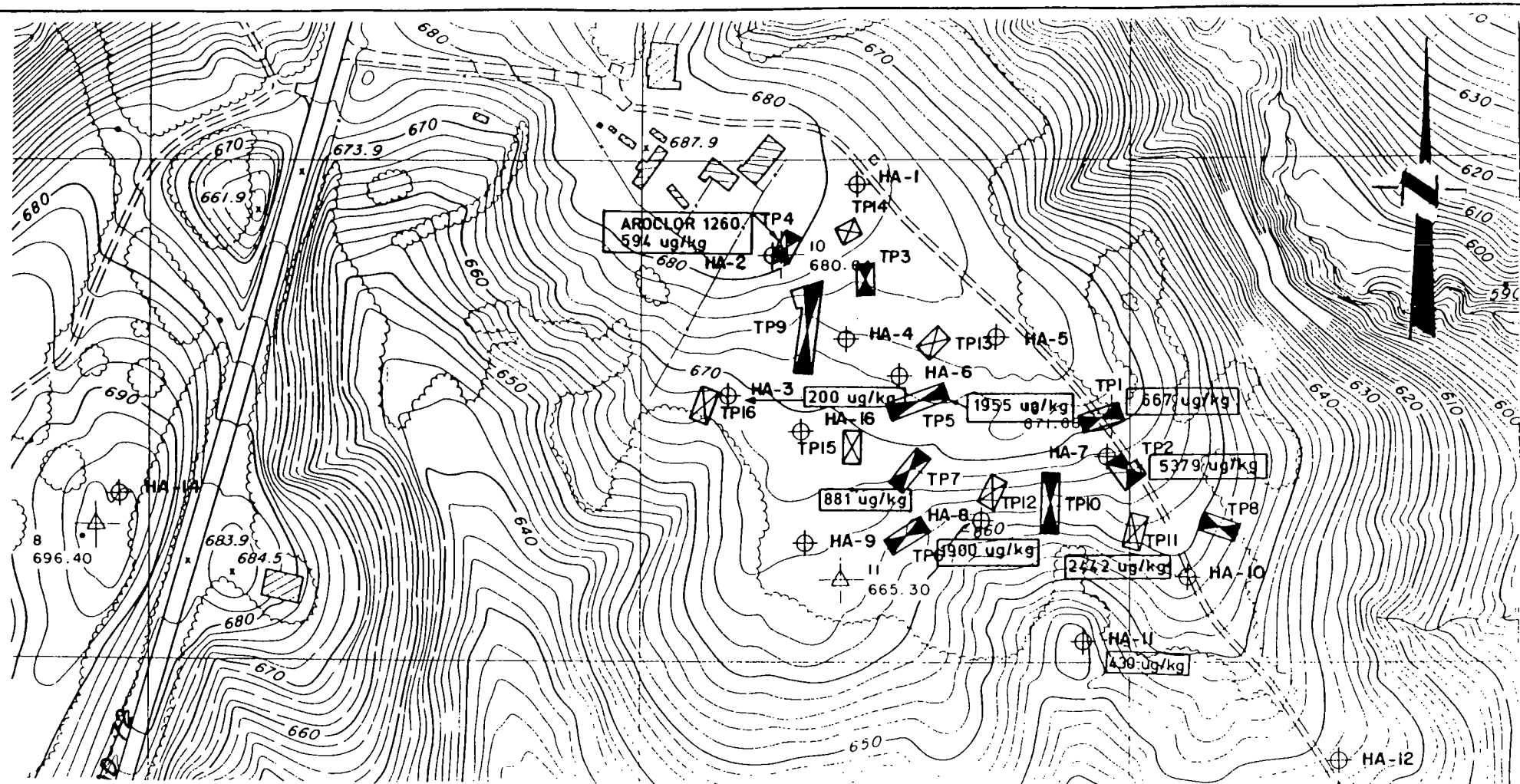
One pesticide was detected in one of the 15 surface soil samples. A trace level of Toxaphene at 330 ug/kg was found at sampling point HA-1.


7.2.2 Subsurface Soils


No vertical pattern of chemical distribution in subsurface soils is apparent. Elevated contaminant concentrations were generally found in samples collected from depths of less than 17 feet. Elevated levels of VOCs, however, were noted at depths as great as 27 feet in soil borings (SB) SB-2, SB-4, and SB-9. Low concentrations of SVOCs, ranging from no detection to 77,000 ug/kg, were observed in SB-2, SB-3, and SB-9.

Figure 11 specifies the soil boring locations, the VOC contaminants detected at each soil boring location, the concentrations of the contaminants encountered, and the depths the samples were collected. Figure 12 provides the same degree of information as Figure 11 does, but for SVOCs rather than VOCs. Figure 12 also furnishes background concentrations for several metals for samples collected from boring SB-1.

Due to the lack of steep topography in the immediate disposal areas, the vegetative cover, and the nature of chemical residuals at the Site, overland migration of residual chemicals away from the former disposal area was not significant. The immediate emergency removal action taken by EPA (June-July 1983) successfully removed the major portion of the source material and highly contaminated soils.



 Location and Extent of Test Plots Excavated During RI-Phase IA (Feb.-Mar., 1989)

 Location and Extent of Test Plots Excavated During RI-Phase IB (Dec., 1989)


 Hand Auger Surface Soil Sampling Location



Figure 10

Concentrations of PCB's in Soil

Medley Farms Site
Gaffney, South Carolina

In summary, there appears to be no uniform vertical or horizontal distribution of the residual chemicals present in the soils at the Site. Instead, chemical residuals are concentrated in localized areas related to former direct disposal activities (lagoons and/or drum disposal areas), refer to Figure 5.

7.3 GROUNDWATER

Elevated concentrations of VOCs were noted in shallow monitoring wells (SW) SW-3, SW-4, BW-2, SW-108, and bedrock monitoring well (BW) BW-108. Trace levels of VOCs were detected in SW-101, BW-106, and BW-109. No SVOCs, pesticides, or PCBs were detected in groundwater. Samples collected from monitoring wells installed during Phase IA were analyzed for inorganics. Based on the analytical results, it was determined that any inorganics present in the groundwater were not Site-related.

Table 6 provides a comprehensive list of VOCs detected in the groundwater and their concentrations at the Medley Farm site. Table 7 lists the inorganics and their concentrations for groundwater samples collected from the saprolite wells and Table 8 lists the inorganics and their concentrations for groundwater samples collected from the bedrock wells. Table 9 lists the detection frequencies and the range of concentrations of VOCs found in the saprolite aquifer. Table 10 provides the same degree of information as Table 9 but for VOCs detected in the bedrock aquifer. Those compounds listed in Tables 9 and 10 with an asterisk placed in front of them were identified as chemicals of potential concern.

Figure 13 depicts the contaminants found in each monitoring well completed in the saprolite aquifer and Figure 14 lists the contaminants detected in each bedrock monitoring well. These figures also provide the dates these samples were collected.

Based on data collected during the RI, the horizontal extent of groundwater contamination appears to be limited to portions of the aquifer directly beneath and downgradient of the former disposal areas. VOCs in groundwater are estimated to have traveled 500 to 600 feet in an east-southeasterly direction from the disposal area, in the direction of groundwater flow. Concentrations observed at this distance are detectable, but below established regulatory limits. The highest VOC concentrations detected in the saprolite were found in groundwater immediately beneath the former disposal area with concentrations decreasing with distance from the disposal area. Vertically, VOCs have also migrated into the bedrock zone of the underlying aquifer. Within the confines of the former disposal area, groundwater contamination extends from a depth of approximately 60 feet to a depth of approximately 120 feet from land surface. Two deep bedrock wells (BW-111 and BW-112) installed at the Site encountered competent bedrock beginning at depths of approximately 160-170 feet beneath the Site; consequently, these two deep wells are dry and therefore could not be sampled.

TABLE 6
MEDLEY FARM SITE RI - ANALYTICAL DATA SUMMARY
VOLATILE ORGANIC COMPOUNDS DETECTED ABOVE QUANTITATION LIMITS
IN GROUND WATER (ug/l), PHASE IA, PHASE IB, AND PHASE II (See Notes)

SAMPLE LOCATION	BW1		SW1	BW2			SW3
SAMPLE I.D.	*BW1-3	BW1-4	SW1-4	BW2-1	BW2-2	BW2-3	SW3-1
SAMPLE DATE	09-28-90	11-27-90	11-27-90	08-09-89	01-10-90	09-28-90	08-08-89
PHASE	PHASE II	PHASE II (Resample)	PHASE II (Resample)	PHASE IA	PHASE IB	PHASE II	PHASE IA
PARAMETER							
Acetone	19		5 BJ			18	
Benzene							
Carbon tetrachloride							
Chloroform					10		
Chloromethane							
Methylene chloride		4 BJ	3 BJ	110 D			
Tetrachloroethene				35 D	18	8	190
Toluene							
Trichloroethene				720 D	530 D	140	140
1,1,2,2-Tetrachloroethane							
1,1,1-Trichloroethane				310 D	270 D	110	
1,1,2-Trichloroethane							
1,1-Dichloroethene				440 D	340 D	130	8
1,2-Dichloroethene (total)							9
1,1-Dichloroethane							
1,2-Dichloroethane				290 D	260 D	120	
2-Butanone							
2-Hexanone							

Notes:

- 1) No volatile organic compounds were detected above quantitation limits in samples BW4-1, SW1-1, BW1-1, BW3-1, BW4-2, BW110-3, SW106-1, SW102-3, SW104-3, and SW109-3. Compounds identified as common laboratory contaminants in EPA guidance were considered to be present in a sample only if the reported concentration was greater than 10 times the concentration reported in any laboratory blank (see Section 5.10.2 for discussion of data validation) in accordance with EPA guidance.
 - D- Sample diluted for this analyte.
 - E- Estimated result. Analyte concentration exceeded the instrument calibration range.
 - B- Analyte detected in the associated blank. Result not corrected.
 - J- Estimated result. Analyte detected at less than the sample quantitation limit. Constituents detected at less than quantitation limits are reported only for analytical results of BW1-4, SW1-4, BW4-4, and SW106-4 for comparison to initial Phase II results at these locations.
- * Raw data results for BW1-3, SW1-2, BW4-3 and SW106-3 were inconsistent with concentrations previously reported. These wells were subsequently resampled (Nov. 26 and 27, 1990) and samples were submitted to Ecotek Laboratory for analysis. The Ecotek results are indicated by the 'Resample' designation.

TABLE 6 (continued)
 MEDLEY FARM SITE RI - ANALYTICAL DATA SUMMARY
 VOLATILE ORGANIC COMPOUNDS DETECTED ABOVE QUANTITATION LIMITS
 IN GROUND WATER (ug/l), PHASE IA, PHASE IB, AND PHASE II (See Notes)

SAMPLE LOCATION	SW3		BW4		SW4		
SAMPLE I.D.	SW3-2	SW3-3	*BW4-3	BW4-4	SW4-1	SW4-2	SW4-3
SAMPLE DATE	01-09-90	09-25-90	09-26-90	11-26-90	08-08-89	01-09-90	09-25-90
PHASE	PHASE IB	PHASE II	PHASE II	PHASE II (Resample)	PHASE IA	PHASE IB	PHASE II
PARAMETER							
Acetone							
Benzene							
Carbon tetrachloride			130				
Chloroform			74				
Chloromethane	15						
Methylene chloride			4 BJ				
Tetrachloroethene	200	190					
Toluene			9.5				
Trichloroethene	130	190	49				
1,1,2,2-Tetrachloroethane			19				
1,1,1-Trichloroethane	5.6						
1,1,2-Trichloroethane			18	3400 D	2800 E	2500 D	
1,1-Dichloroethene				8	13		
1,2-Dichloroethene (total)	5.4			1800 D	2100 E	2200 D	
1,1-Dichloroethane				120	38		
1,2-Dichloroethane			13				
2-Butanone							
2-Hexanone							

Notes:

- 1) No volatile organic compounds were detected above quantitation limits in samples BW4-1, SW1-1, BW1-1, BW3-1, BW4-2, BW110-3, SW106-1, SW102-3, SW104-3, and SW109-3. Compounds identified as common laboratory contaminants in EPA guidance were considered to be present in a sample only if the reported concentration was greater than 10 times the concentration reported in any laboratory blank (see Section 5.10.2 for discussion of data validation) in accordance with EPA guidance.
- D- Sample diluted for this analyte.
- E- Estimated result. Analyte concentration exceeded the instrument calibration range.
- B- Analyte detected in the associated blank. Result not corrected.
- J- Estimated result. Analyte detected at less than the sample quantitation limit. Constituents detected at less than quantitation limits are reported only for analytical results of BW1-4, SW1-4, BW4-4, and SW106-4 for comparison to initial Phase II results at these locations.
- * Raw data results for BW1-3, SW1-2, BW4-3 and SW106-3 were inconsistent with concentrations previously reported. These wells were subsequently resampled (Nov. 26 and 27, 1990) and samples were submitted to Ecotek Laboratory for analysis. The Ecotek results are indicated by the 'Resample' designation.

TABLE 6 (continued)
MEDLEY FARM SITE RI - ANALYTICAL DATA SUMMARY
VOLATILE ORGANIC COMPOUNDS DETECTED ABOVE QUANTITATION LIMITS
IN GROUND WATER (ug/l), PHASE IA, PHASE IB, AND PHASE II (See Notes)

SAMPLE LOCATION	SW101	BW105			BW106	SW108	
SAMPLE I.D.	SW101-3	BW105-1X	BW105-1Z	BW105-3	BW106-1	*SW108-3	SW108-4
SAMPLE DATE	09-26-90	09-19-90	09-18-90	10-15-90	09-28-90	09-27-90	11-26-90
PHASE	PHASE II	PHASE II	PHASE II	PHASE II	PHASE II	PHASE II	PHASE II (Resample)
PARAMETER							
Acetone						160	5 BJ
Benzene		95		11			
Carbon tetrachloride							
Chloroform							
Chloromethane		110					
Methylene chloride							4 BJ
Tetrachloroethene							
Toluene						91	
Trichloroethene							
1,1,2,2-Tetrachloroethane							
1,1,1-Trichloroethane	7	90	80	9	5.2	9.3	
1,1,2-Trichloroethane							
1,1-Dichloroethene		27	39				
1,2-Dichloroethene (total)							
1,1-Dichloroethane							
1,2-Dichloroethane							
2-Butanone					13	170	
2-Hexanone						14	

Notes:

- 1) No volatile organic compounds were detected above quantitation limits in samples BW4-1, SW1-1, BW1-1, BW3-1, BW4-2, BW110-3, SW106-1, SW102-3, SW104-3, and SW109-3. Compounds identified as common laboratory contaminants in EPA guidance were considered to be present in a sample only if the reported concentration was greater than 10 times the concentration reported in any laboratory blank (see Section 5.10.2 for discussion of data validation) in accordance with EPA guidance.
- D- Sample diluted for this analyte.
- E- Estimated result. Analyte concentration exceeded the instrument calibration range.
- B- Analyte detected in the associated blank. Result not corrected.
- J- Estimated result. Analyte detected at less than the sample quantitation limit. Constituents detected at less than quantitation limits are reported only for analytical results of BW1-4, SW1-4, BW4-4, and SW106-4 for comparison to initial Phase II results at these locations.
- * Raw data results for BW1-3, SW1-2, BW4-3 and SW106-3 were inconsistent with concentrations previously reported. These wells were subsequently resampled (Nov. 26 and 27, 1990) and samples were submitted to Ecotek Laboratory for analysis. The Ecotek results are indicated by the 'Resample' designation.

TABLE 6 (continued)
 MEDLEY FARM SITE RI - ANALYTICAL DATA SUMMARY
 VOLATILE ORGANIC COMPOUNDS DETECTED ABOVE QUANTITATION LIMITS
 IN GROUND WATER (ug/l), PHASE IA, PHASE IB, AND PHASE II (See Notes)

SAMPLE LOCATION	BW108	SW108	BW109
SAMPLE I.D.	BW108-3	SW108-3	BW109-3
SAMPLE DATE	10-02-90	09-25-90	10-15-90
<u>PARAMETER</u>			
Acetone			
Benzene			
Carbon tetrachloride			
Chloroform			6
Chloromethane		26	
Methylene chloride			
Tetrachloroethene	230	30	
Toluene			
Trichloroethene	380	45	
1,1,2,2-Tetrachloroethane			
1,1,1-Trichloroethane	15	13	6
1,1,2-Trichloroethane			
1,1-Dichloroethene	80	11	
1,2-Dichloroethene (total)	17		
1,1-Dichloroethane			
1,2-Dichloroethane	12		
2-Butanone			
2-Hexanone			

Notes:

- 1) No volatile organic compounds were detected above quantitation limits in samples BW4-1, SW1-1, BW3-1, BW4-2, BW110-3, SW106-1, SW102-3, SW104-3, and SW109-3. Compounds identified as common laboratory contaminants in EPA guidance were considered to be present in a sample only if the reported concentration was greater than 10 times the concentration reported in any laboratory blank (see Section 5.10.2 for discussion of data validation) in accordance with EPA guidance.

D- Sample diluted for this analyte.

E- Estimated result. Analyte concentration exceeded the instrument calibration range.

B- Analyte detected in the associated blank. Result not corrected.

J- Estimated result. Analyte detected at less than the sample quantitation limit. Constituents detected at less than quantitation limits are reported only for analytical results of BW1-4, SW1-4, BW4-4, and SW106-4 for comparison to initial Phase II results at these locations.

- * Raw data results for BW1-3, SW1-2, BW4-3 and SW106-3 were inconsistent with concentrations previously reported. These wells were subsequently resampled (Nov. 26 and 27, 1990) and samples were submitted to Ecotek Laboratory for analysis. The Ecotek results are indicated by the 'Resample' designation.

TABLE 7
MEDLEY FARM SITE RI
ANALYTICAL DATA SUMMARY
METALS DETECTED
IN
GROUND WATER (ug/l) - See Notes
SAPROLITE WELLS

					EPA Drinking Water Regulations	
SAMPLE LOCATION	SW1		SW3	SW4	Promulgated	Proposed
SAMPLE I.D.	SW1-01	SW1-02	SW3-01	SW4-01	MCLs (ug/l)	MCLs (ug/l)
PARAMETER						
Aluminum, total	189000	12900	11800	41400	•	•
Aluminum, dissolved						
Antimony, total	492	BDL (c)	BDL (c)	BDL (c)	•	10/5 (g)
Antimony, dissolved						
Arsenic, total	65.6	BDL (b)	BDL (c)	BDL (c)	50 (d)	•
Arsenic, dissolved						
Barium, total	1690	BDL (b)	BDL (b)	592	1000 (d)	2000 (h)
Barium, dissolved						
Beryllium, total	14.2	BDL (c)	BDL (b)	6	•	1 (g)
Beryllium, dissolved						
Cadmium, total	7	BDL (c)	BDL (c)	BDL (c)	5 (i)	•
Cadmium, dissolved						
Calcium, total	34100	BDL (b)	8490	18500	•	•
Calcium, dissolved						
Chromium, total	97.8	BDL (b)	12.7	20.8	100 (i)	•
Chromium, dissolved						
Cobalt, total	183	BDL (b)	BDL (b)	BDL (b)	•	•
Cobalt, dissolved						
Copper, total	307	BDL (b)	45.2	BDL (c)	1000 (e)	1300 (f)
Copper, dissolved						
Iron, total	266000	17900	14600	24.3	300 (e)	•
Iron, dissolved						
Lead, total	45.8	4.8	5.3	24.3	50 (d)	(15) (j)
Lead, dissolved						
Magnesium, total	143000	9390 (a)	6150	24300	•	•
Magnesium, dissolved						
Manganese, total	10700	727	794	3210	50 (e)	•
Manganese, dissolved						
Mercury, total	BDL (c)	BDL (c)	BDL (c)	BDL (c)	2 (d)	•
Mercury, dissolved						
Nickel, total	116	BDL (c)	BDL (c)	BDL (b)	•	100 (g)
Nickel, dissolved						
Potassium, total	105000	7690	6180	9100	•	•
Potassium, dissolved						
Selenium, total	BDL (c)	BDL (c)	BDL (c)	BDL (c)	50 (i)	•
Selenium, dissolved						
Silver, total	BDL (c)	BDL (c)	20.2	BDL (c)	100 (e)	•
Silver, dissolved						
Sodium, total	BDL (b)	9730	9930	12600	•	•
Sodium, dissolved						
Thallium, total	BDL (b)	BDL (c)	BDL (c)	BDL (c)	•	2/1 (g)
Thallium, dissolved						
Vanadium, total	305	BDL (b)	BDL (b)	72.3	•	•
Vanadium, dissolved						
Zinc, total	1290	92.5	19 (a)	884 (a)	5000 (e)	•
Zinc, dissolved						

Notes: (a) Estimated result.
 (b) Below contract required detection limit.
 (c) Below instrument detection limit.
 (d) Primary Maximum Contaminant Level (MCL)
 (e) Secondary MCL for public water systems
 (f) Federal Register, August 18, 1988
 (g) Federal Register, July 25, 1989
 (h) Federal Register, January 30, 1991
 (i) Federal Register, January 30, 1991 (effective date July 30, 1992)
 (j) Superfund cleanup level

TABLE 8
MEDLEY FARM SITE RI
ANALYTICAL DATA SUMMARY
METALS DETECTED
IN
GROUND WATER (ug/l) - See Notes
BEDROCK WELLS

					EPA Drinking Water Regulations	
SAMPLE LOCATION	BW1		BW2	BW4	Promulgated	Proposed
SAMPLE I.D.	BW1-1	BW1-3	BW2-1	BW4-1	MCLs (ug/l)	MCLs (ug/l)
PARAMETER						
Aluminum, total	1730	395	500	5570	•	•
Aluminum, dissolved		BDL (b)				
Antimony, total	BDL (c)	BDL (c)	BDL (c)	BDL (c)	•	10/5 (g)
Antimony, dissolved		BDL (c)				
Arsenic, total	BDL (b)	BDL (c)	BDL (c)	BDL (c)	50 (d)	•
Arsenic, dissolved		12.2				
Barium, total	BDL (b)	BDL (b)	BDL (b)	BDL (b)	1000 (d)	2000 (h)
Barium, dissolved		BDL (b)				
Beryllium, total	BDL (c)	BDL (c)	BDL (c)	BDL (c)	•	1 (g)
Beryllium, dissolved		BDL (c)				
Cadmium, total	BDL (c)	BDL (c)	10	BDL (c)	5 (i)	•
Cadmium, dissolved		BDL (c)				
Calcium, total	9690	6990	7300	32200	•	•
Calcium, dissolved		6770				
Chromium, total	BDL (b)	BDL (c)	BDL (c)	BDL (b)	100 (i)	•
Chromium, dissolved		BDL (b)				
Cobalt, total	BDL (b)	BDL (c)	BDL (c)	BDL (b)	•	•
Cobalt, dissolved		BDL (c)				
Copper, total	BDL (b)	BDL (c)	BDL (c)	BDL (c)	1000 (e)	1300 (f)
Copper, dissolved		BDL (b)				
Iron, total	1900	613	870	3410	300 (e)	•
Iron, dissolved		BDL (b)				
Lead, total	5.8	4	BDL (b)	BDL (c)	50 (d)	(15) (j)
Lead, dissolved		BDL (b)				
Magnesium, total	BDL (b)	BDL (b)	BDL (b)	13400	•	•
Magnesium, dissolved		BDL (b)				
Manganese, total	59.7	BDL (b)	33	183	50 (e)	•
Manganese, dissolved		BDL (b)				
Mercury, total	BDL (c)	BDL (c)	BDL (c)	BDL (c)	2 (d)	•
Mercury, dissolved		BDL (c)				
Nickel, total	BDL (c)	BDL (c)	BDL (b)	BDL (c)	•	100 (g)
Nickel, dissolved		BDL (c)				
Potassium, total	BDL (b)	BDL (b)	BDL (b)	BDL (c)	•	•
Potassium, dissolved		BDL (b)				
Selenium, total	BDL (c)	BDL (c)	BDL (c)	BDL (c)	50 (i)	•
Selenium, dissolved		BDL (c)				
Silver, total	BDL (b)	BDL (c)	BDL (c)	BDL (c)	100 (e)	•
Silver, dissolved		BDL (b)				
Sodium, total	10700	9000	8400	12900	•	•
Sodium, dissolved		9100				
Thallium, total	BDL (c)	BDL (c)	BDL (c)	BDL (c)	•	2/1 (g)
Thallium, dissolved		BDL (c)				
Vanadium, total	BDL (b)	BDL (b)	BDL (c)	BDL (b)	•	•
Vanadium, dissolved		BDL (b)				
Zinc, total	BDL (b)	BDL (b)	110	38.7 (a)	5000 (e)	•
Zinc, dissolved		BDL (b)				

Notes: (a) Estimated result.
 (b) Below contract required detection limit.
 (c) Below instrument detection limit.
 (d) Primary Maximum Contaminant Level (MCL)
 (e) Secondary MCL for public water systems
 (f) Federal Register, August 18, 1988
 (g) Federal Register, July 25, 1990
 (h) Federal Register, January 30, 1991
 (i) Federal Register, January 30, 1991 (effective date July 30, 1992)
 (j) Superfund cleanup level

TABLE 9

CHEMICALS DETECTED IN GROUND WATER - SAPROLITE WELLS
MEDLEY FARM SITE

Chemical	Frequency of Detection	Contract Required Quantitation Limit (ug/l)	Range of Detected Concentrations (ug/l) ^(a)
<u>Volatile Organic Compounds</u>			
*1,1-Dichloroethene	6/14	5	1.1-2200
*1,1-Dichloroethane	2/14	5	38-120
*1,1,1-Trichloroethane	9/14	5	1.5-3400
*1,1,2-Trichloroethane	2/14	5	8-13
*1,2-Dichloroethene (total)	3/14	5	5.4-31
Acetone	1/14	10	7
Benzene	1/14	5	0.7
Bromomethane	3/14	10	1.9-3
Carbon Disulfide	1/14	5	3
Chlorobenzene	1/14	5	0.9
Chloroform	2/14	5	3-4
*Chloromethane	3/14	10	5.5-26
*Methylene Chloride	3/14	5	2.1-38
*Tetrachloroethene	5/14	5	2-200
Toluene	2/14	5	1-1.5
*Trichloroethene	5/14	5	6-190
<u>Semi-Volatile Organic Compounds</u>			
1,2,4-Trichlorobenzene	1/2	10	3

* Chemical of potential concern

(a) Detected concentrations include estimated results (chemical concentrations less than the contract-required quantitation limit).

TABLE 10
CHEMICALS DETECTED IN GROUND WATER - BEDROCK WELLS
MEDLEY FARM SITE

Chemical	Frequency of Detection	Contract Required Quantitation Limit (ug/l)	Range of Detected Concentrations (ug/l) (a)
<u>Volatile Organic Compounds</u>			
*1,1-Dichloroethene	6/15	5	2.2-440
1,1-Dichloroethane	2/15	5	2-3
*1,1,1-Trichloroethane	9/15	5	4-310
1,1,2-Trichloroethane	1/15	5	3
*1,2-Dichloroethane	5/15	5	12-290
*1,2-Dichloroethene (total)	2/15	5	2-17
*2-Butanone	4/15	10	6.8-13
*Acetone	3/15	10	1-18
*Benzene	1/15	5	11
Carbon Disulfide	1/15	5	4
Chlorobenzene	1/15	5	1
*Chloroform	6/15	5	4-7
Chloromethane	1/15	10	2
*Methylene Chloride	3/15	5	48-110
*Tetrachloroethene	5/15	5	8-230
Toluene ^(b)	2/15	5	3-5
*Trichloroethene	5/15	5	140-720

Semi-Volatile Organic Compounds

None detected

* Chemical of potential concern

(a) Detected concentrations include estimated results (chemical concentrations less than the contract-required quantitation limit).

(b) Detected concentrations of 5 ug/l is for a diluted sample with a Sample Quantitation Limit of 25 ug/l.

The presence of VOCs in both portions of the aquifer, the saprolite and bedrock, is consistent with the interrelated nature of these two water-bearing zones. The concentrations of VOCs decrease with depth. Based on the observed distribution of VOCs, the primary path of contaminant migration in groundwater is through the saprolite and the bedrock transition zone into the fractured bedrock.

7.4 STREAM SEDIMENT/SURFACE WATER

No contaminants were detected in the surface water samples, the sediment samples, or the monitoring wells closest to Jones Creek. However, based on analytical data for samples collected from monitoring wells SW-108, BW-108, and BW-106, groundwater contaminated with VOCs may be entering tributaries to Jones Creek. Even if this is the case, any VOCs discharging into either of these tributaries along with the groundwater, are volatilizing from the water column prior to commingling with the waters in Jones Creek. This is verified by the analytical data for surface water and sediment samples collected from Jones Creek. The locations of the surface water/sediment sampling points can be found in Figure 15.

7.5 HYDROGEOLOGICAL SETTING

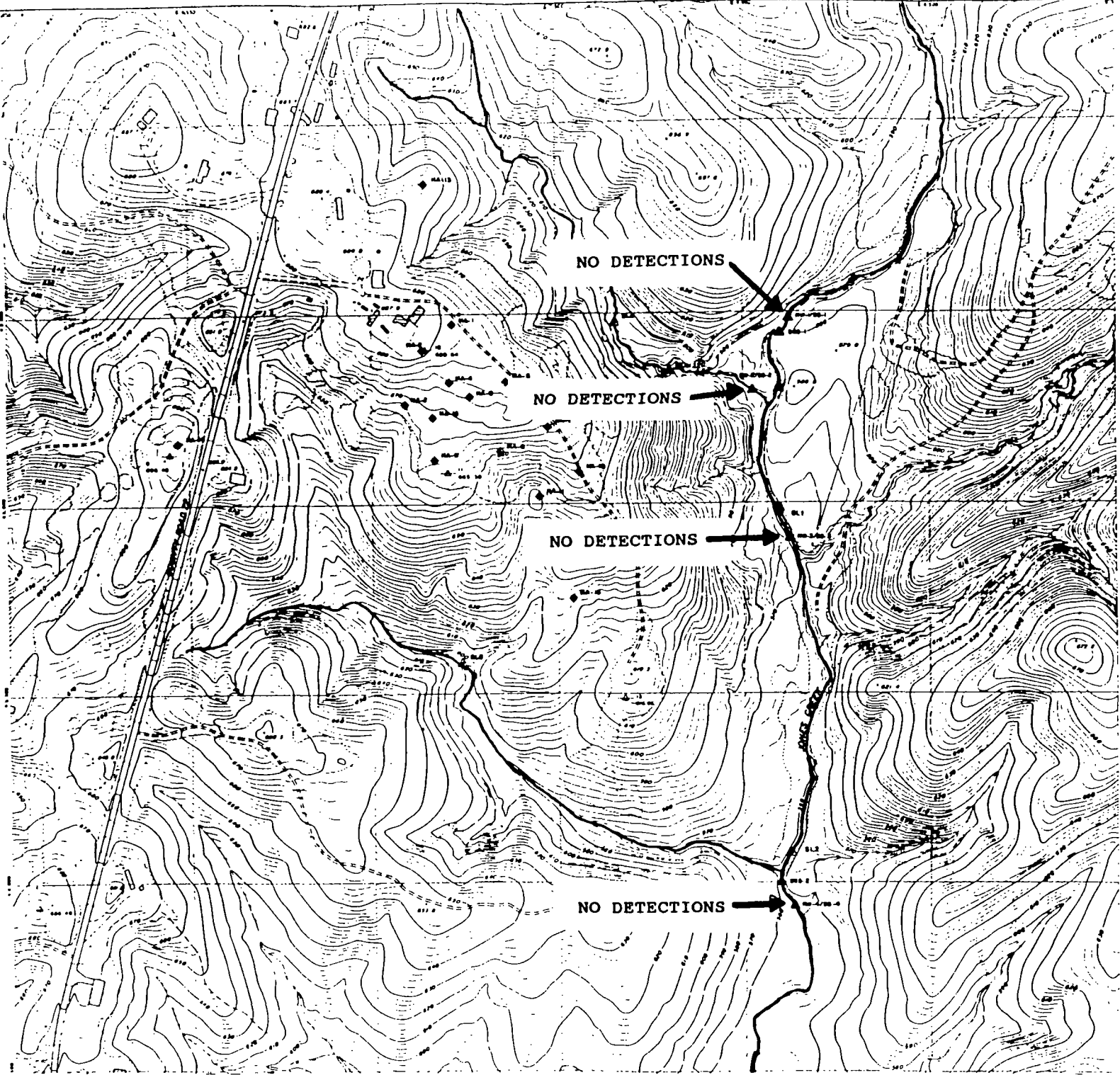
Residual soil at the Site is absent or occurs as a thin layer overlying the saprolite. This soil layer ranges in thickness from zero to 11 feet and typically consists of clayey silt with varying amounts of fine sand, clay, mica flakes, and quartz gravel. In some areas, thin layers of clayey silt/silty clay fill were encountered. The fill was probably placed on-site during the 1983 immediate removal action and Site clean-up. The fill is not significant in terms of overall Site geology.

The saprolite is relatively thick across the Site, ranging from 50 to 70 feet near the former disposal areas to 7 to 28 feet along Jones Creek at the eastern boundary of the property. The lithologic characteristics of the saprolite are similar to the residual soils and are relatively consistent both vertically and horizontally. Saprolite observed in borings drilled at the Site consists predominantly of a silt with varying amounts of fine to coarse sand, clay, mica flakes, and quartz gravel. The predominant relict (texture) and foliation indicate parent rocks of metasiltstone, gneiss, and mica schist, though in several instances, the parent rock was not identifiable.

The bedrock was investigated by continuous coring at numerous locations. The bedrock consists primarily of a gneiss that varies from a schistose gneiss to a quartzo-feldspathic and quartz-amphibole gneiss. The bedrock is predominantly hard, slightly weathered to fresh, gray, and fine to medium-grained, with closely to moderately closely (0.5 to 2.5 feet) spaced joints. The joints tend to be smooth to rough and moderately dipping (35 to 55 degrees). Foliation of the bedrock is moderately dipping (35 to 55 degrees) to steep (55 to 85 degrees).

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HORIZONTAL CONTROL, P.M.T.
 VERTICAL CONTROL, P.M.T.
 INDEX CONTOUR
 INTERMEDIATE CONTOUR
 SPOT ELEVATION
 SPOT ELEVATION
 FILE
 WATER
 IMPROVED ROAD
 DIRT ROAD
 BUILDING
 LOCATED OBJECT
 FENCE
 POLE
 TREE
 BRUSH

- ▲ Location of Surface Water
Stream Sediment Sampling
- ▲ Location of Stream Gauging
Station
- ▲ Existing Staff Gauging Sta-
- ◆ Location of Surface Soil Sur-

NOTE:
 Surface Water (SW) and Stream
 Sediment (SS) were sampled at
 the Phase 10 (Jan. 1998)
 Stream Gauging Station (SG)
 constructed at permanent site
 during the Phase 10 (Jan. 1998)

FIGURE 1
 LOCATION:
 OF SURFA
 WATER/
 SEDIMENT
 SAMPLES

Auger refusal was encountered at depths ranging from approximately 70 to 100 feet within the former disposal area. The overburden thickness decreases outward toward the boundaries of the Medley property, to a minimum of approximately 20 feet adjacent to Jones Creek. Evidence of groundwater movement through the bedrock was observed in the form of iron oxide staining along joint surfaces.

Groundwater at the Medley Farm site occurs in the saprolite, in the zone of highly fractured and weathered bedrock zone (identified as the transition zone), and in moderately fractured bedrock underlying the Site. Depth to groundwater at the Site is on the order of 56 to 68 feet in the disposal area, decreasing to six to eight feet adjacent to Jones Creek.

Subsurface conditions encountered at the Site are depicted in several cross sections of the Medley property. Figure 16 provides the orientation of the cross sectional views A-A', B-B', and C-C'. Figure 17, Figure 18, and Figure 19 show each cross sectional view, respectively.

In general, an aquifer system consisting of flow through both porous and fractured media exists in the Piedmont Province and at the Medley Farm site. The water table generally occurs in the saprolite across most of the Medley Farm property, with the saprolite serving as a porous medium for groundwater flow. In the vicinity of BW-2 at the eastern edge of the former disposal area, the water table occurs in the bedrock transition zone. Although the groundwater occurring in the saprolite and bedrock is part of an interconnected aquifer system, the groundwater in the bedrock at the Site is under semi-confined to confined conditions, with the exception of the BW-2 vicinity where the water table occurs in the bedrock.

The shallow saprolite has a higher porosity than the bedrock, but due to the low hydraulic conductivity, the saprolite acts mainly as a storage and recharge source for the bedrock. Yields from wells completed in the saprolite are generally very low. Yields from bedrock wells are relatively high, but depend on the nature, quantity, and interconnection of the secondary (fracture) porosity the well encounters. The bedrock wells completed in the moderately fractured bedrock at the Site demonstrate relatively high yields (5-7 gpm). Groundwater in the saprolite wells, however, can be completely evacuated with a bailer requiring several hours for complete recovery of the well.

Groundwater flow in the water-table aquifer at the Medley Farm site is primarily to the southeast towards Jones Creek, as shown in Figure 20. The hydraulic gradient changes slightly across the Site, ranging from 0.056 beneath the former disposal area to 0.046 further downgradient. The primary direction of groundwater flow in the bedrock aquifer is also to the southeast, as shown in Figure 21, with an average hydraulic gradient of 0.042. The calculated horizontal groundwater flow velocities are estimated to range from 1.05 feet/day (384 feet/year) to 1.28 feet/day (486 feet/year) for the saprolite and 0.31 feet/day (81 feet/year) for groundwater in the bedrock.

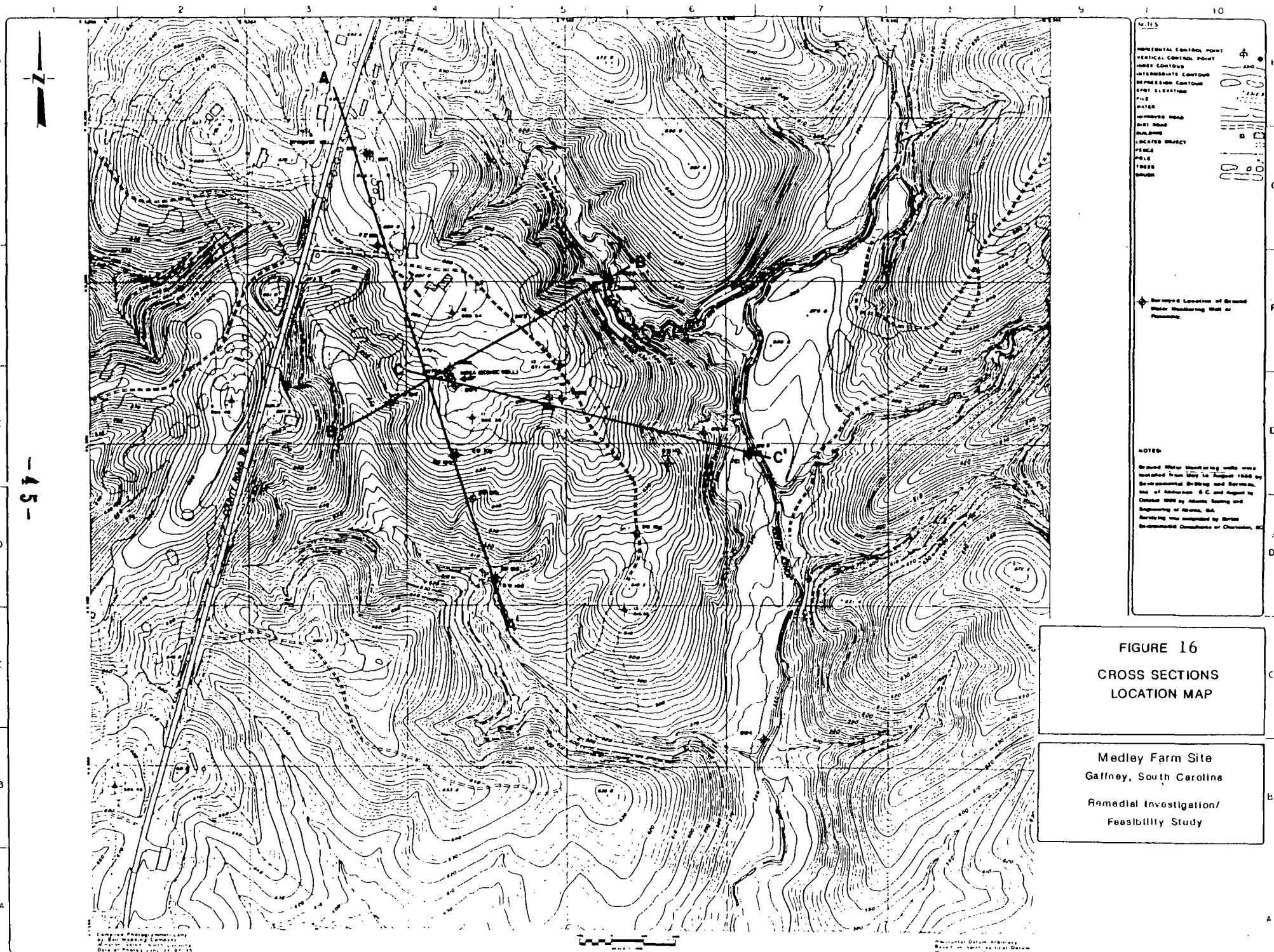


FIGURE 16
CROSS SECTIONS
LOCATION MAP

Medley Farm Site
Gaffney, South Carolina
Remedial Investigation/
Feasibility Study

LEGEND

- LITHOLOGIC CONTACT
- SAPROLITE
VERY SEVERE TO SEVERELY WEATHERED ROCK:
STIFF TO VERY STIFF, TAN TO YELLOWISH-BROWN
TO REDDISH BROWN, CLAYEY SILT TO SILT WITH
FINE QUARTZ VESSELS AND SILT POLYMERIZATION
- TRANSITION ZONE
VERY SEVERE TO MODERATELY WEATHERED ROCK
INCLUDES SOUND ROCK FRAGMENTS IN A SAPROLITE MATRIX
- EXTREMELY TO MODERATELY
FRACTURED BEDROCK
SLIGHT TO VERY SLIGHTLY WEATHERED GNEISS AND SCHIST
WITH VERY CLOSE TO CLOSELY SPACED SUB-ANGULAR
FRACTURES AND JOINTS LESS THAN 1 INCH TO 1 FOOT
FRACTURE SPACING
- SLIGHTLY FRACTURED TO
SOUND BEDROCK
VERY SLIGHTLY WEATHERED TO FRESH GNEISS AND SCHIST
WITH MODERATELY CLOSE TO SPARSELY SPACED FRACTURES
AND JOINTS 1 FOOT TO 16 FEET FRACTURE SPACING
- SPROUSE DOMESTIC WELL
GAGING SURFACE ELEVATION 85.5 V.S.J.
- SAPROLITE MONITORING WELL CORERS
- BEDROCK OPEN CORERS
- POTENTIOMETRIC SURFACE IN SAPROLITE
19-85.20-89
- POTENTIOMETRIC SURFACE IN BEDROCK
19-85.20-89

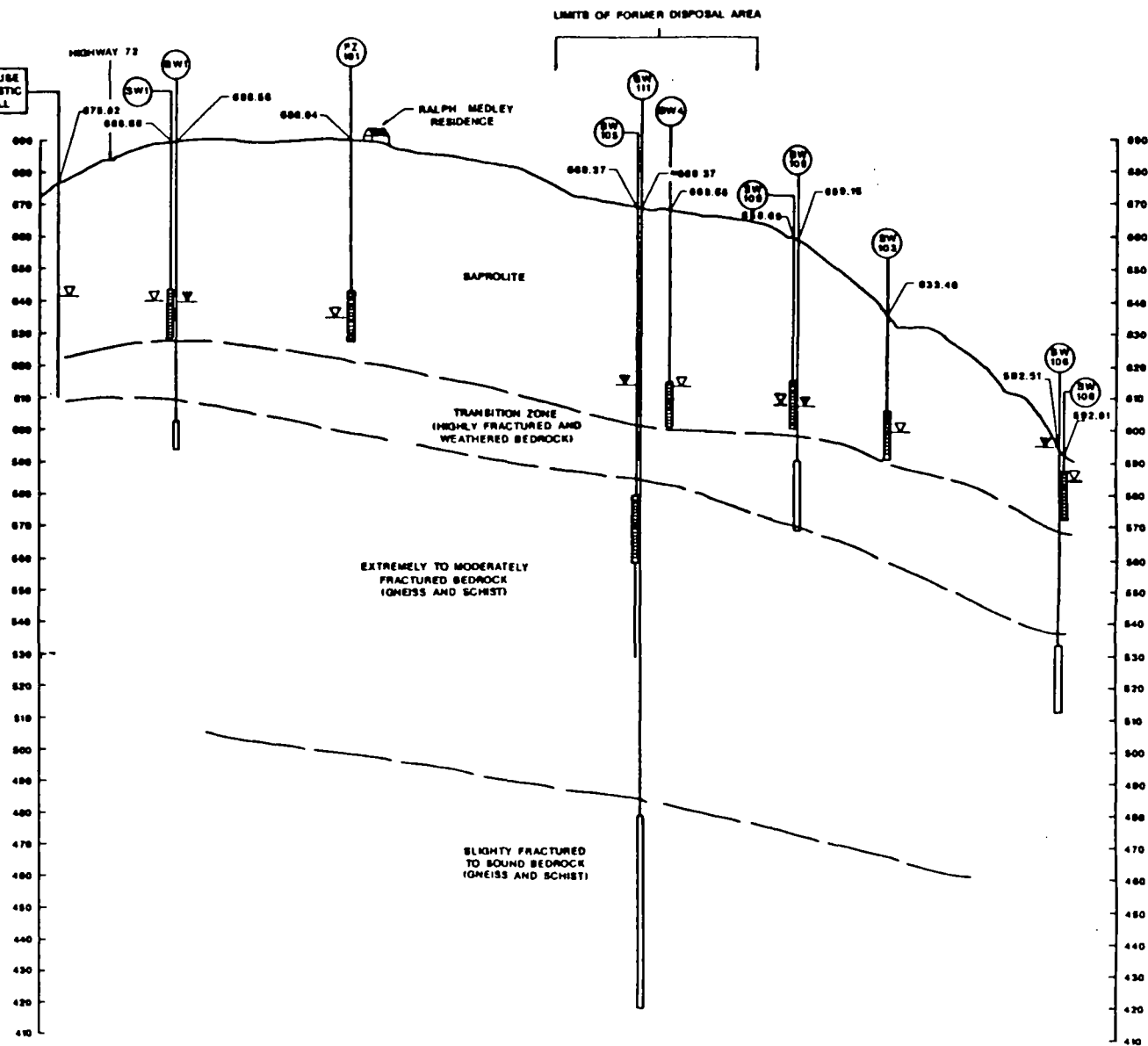
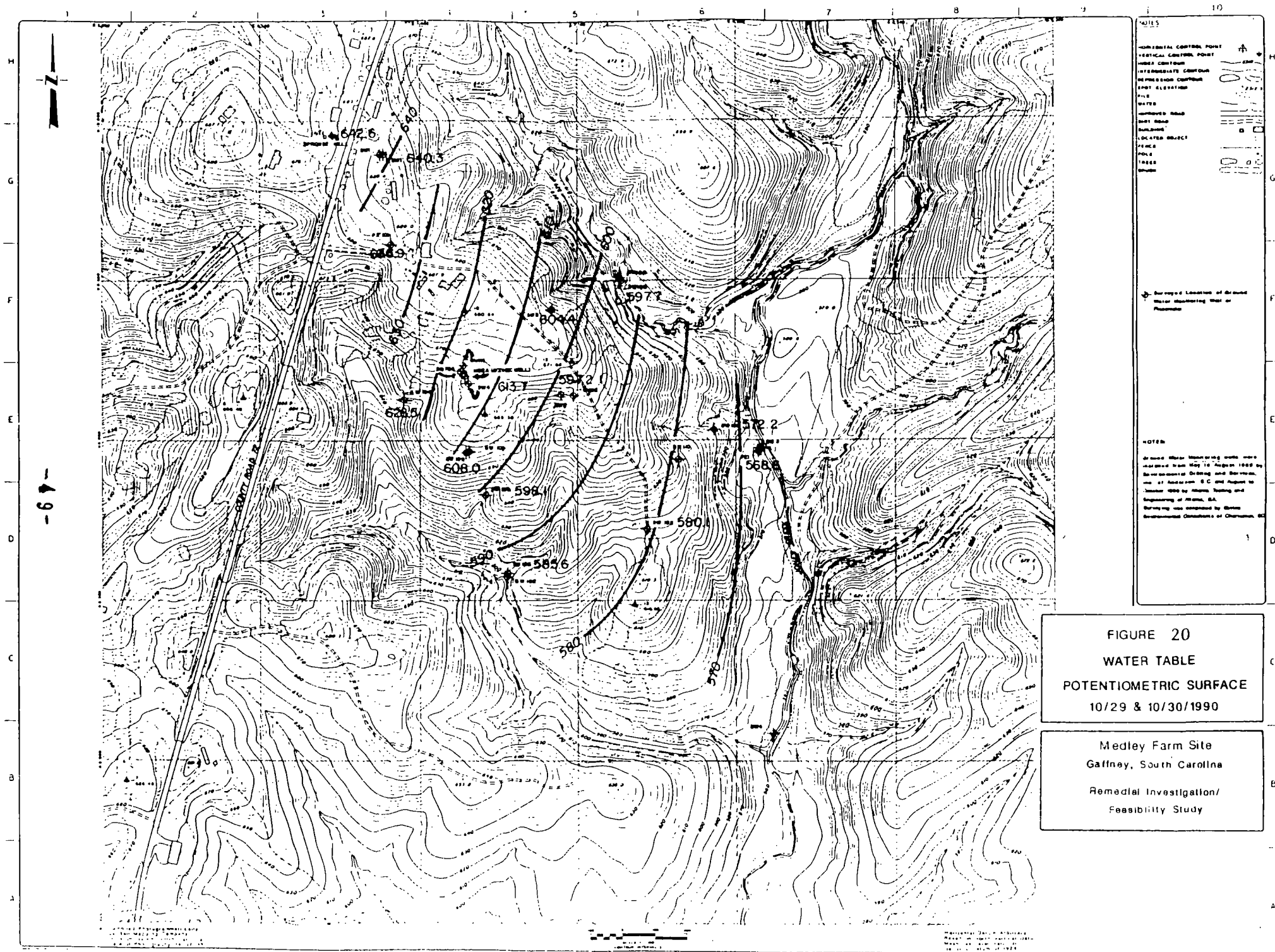


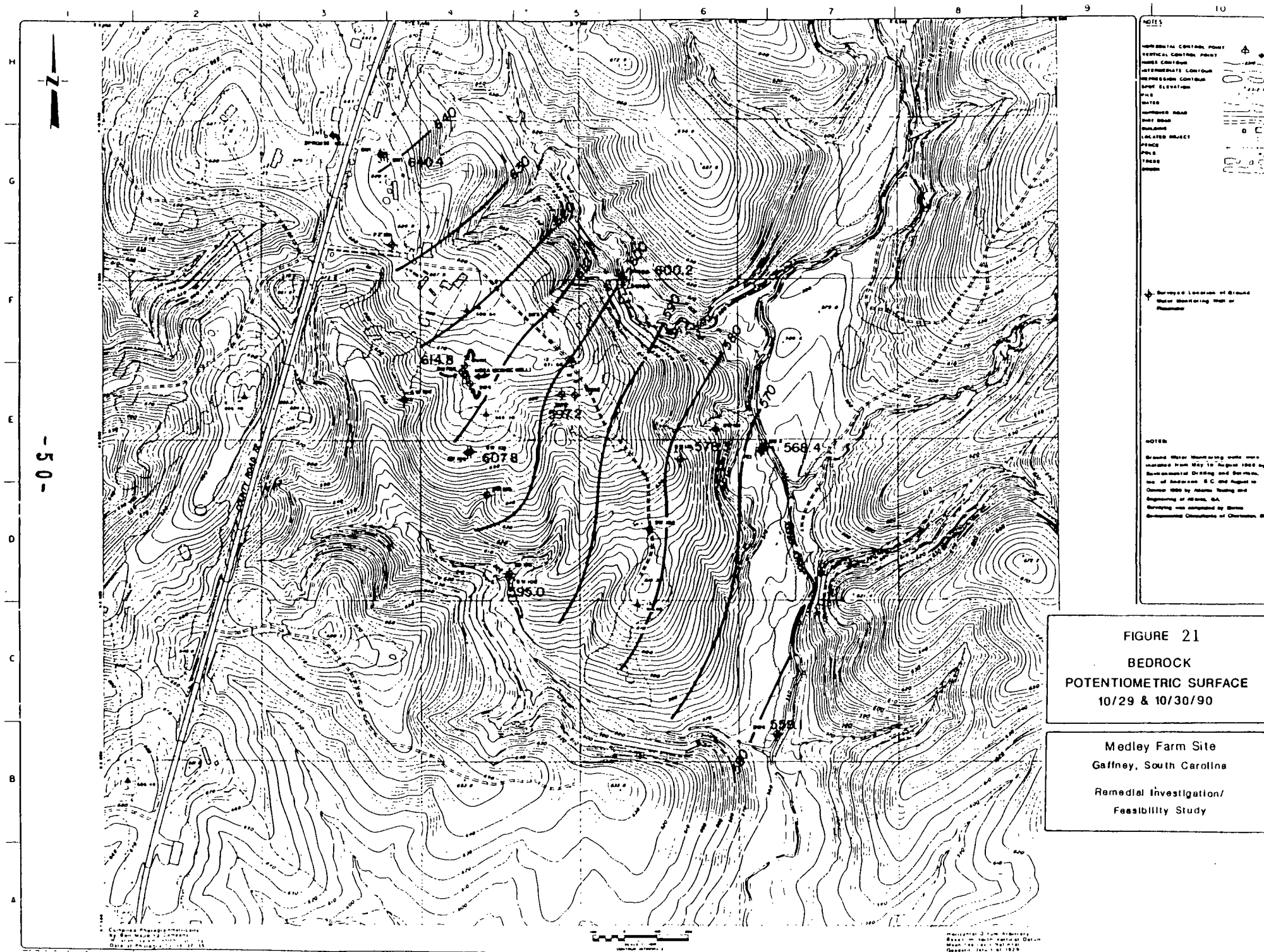
FIGURE 17

GEOLOGIC CROSS SECTION A-A'

LEGEND

---	LITHOLOGIC CONTACT
BAKROLITE	VERY SEVERE TO SEVERELY WEATHERED ROCK, STIFF TO VERY STIFF, TAN TO YELLOWISH-BROWN TO REDDISH BROWN CLAYEY OR 1 TO 1/2" WITH TWO QUARTZ VESSELS AND SELECT FOLIATION
TRANSITION ZONE	VERY SEVERE TO MODERATELY WEATHERED ROCK, INCLUDES SOUND ROCK FRAGMENTS IN A BAKROLITE MATRIX
EXTREMELY TO MODERATELY FRACTURED BEDROCK	SLIGHT TO VERY SLIGHTLY WEATHERED GNEISS AND SCHIST WITH VERY CLOSE TO LOOSELY SPACED SPHERULAR FRACTURES AND JOINTS LESS THAN 1 INCHES TO 1 FOOT FRACTURE SPACING
SLIGHTLY FRACTURED TO SOUND BEDROCK	VERY SLIGHTLY WEATHERED TO FRESH GNEISS AND SCHIST WITH MODERATELY CLOSE TO WIDELY SPACED FRACTURES AND JOINTS 1 FOOT TO 16 FEET FRACTURE SPACING
SW 108	BORING NUMBER
SW 111	GROUND SURFACE ELEVATION (E.S.T.)
SW 4	
SW 2	
SW 112	
SW 110	
SW 3	
PZ1	
SW 1	
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The hydraulic data collected during the RI also showed that the Sprouse well is located hydraulically upgradient of the Site. This was a concern as methylene chloride was detected in samples collected by SCDHEC from the Sprouse well in June 1983 and July 1984. At that time, this contamination was suspected to be Site related. The findings of the RI confirmed that this contamination did not originate from the Medley Farm Superfund site.

Water level measurements made in six saprolite/bedrock well clusters indicate upward vertical hydraulic gradients of varying magnitude across most of the Site. Upward vertical gradients were observed at four monitoring locations (BW-1/SW-1, BW-105/SW-4, BW-106/SW-106, and BW-108/SW-108). Downward vertical gradients were observed at only two locations (BW-3/PZ1 and BW-109/SW-109) monitored during October 1990. The presence of upward vertical gradients indicate vertical migration of contaminants from the Site. The presence of upward vertical gradients reduces the potential for contaminants to move downward in the aquifer.

Jones Creek and its tributaries serve as zones of groundwater discharge from the Medley Farm site. Base flow in Jones Creek at the Site is 200 gpm. Water levels in the saprolite and bedrock adjacent to Jones Creek (PZ-1 and BW-3) are consistently above water levels observed in Jones Creek at staff gauge SL-1. Similarly, water levels in the saprolite and bedrock at SW-108 and BW-108 are greater than water levels observed in the tributary at staff gauge SL-3. The water level in BW-106 is greater than the water level observed in the tributary at staff gauge SL-5. However, the water level in SW-106 is less than the water level observed at staff gauge SL-5, indicating localized surface water recharge to the saprolite aquifer at this location. Refer to Figure 15 for the staff gauge locations.

8.0 SUMMARY OF SITE RISKS

Based upon reasonable maximum exposures to residual chemicals at the Medley Farm Site, the risk assessment showed that there is neither significant carcinogenic nor non-carcinogenic risk to either human health or the environment under present day, baseline conditions. The cumulative carcinogenic human health risk at the Site is estimated to be 8.6×10^{-7} . This baseline risk is acceptable as this risk is below the 1×10^{-6} level and the EPA remediation level goals of 10^{-4} to 10^{-6} for Site remediation. This risk level of 8.6×10^{-7} is attributable to Site soils as there are no groundwater receptors on the Site or downgradient near the property boundary.

The potential for non-carcinogenic human health effects under present day conditions (hazard index = 2.9×10^{-4}) is below the EPA hazard quotient of one. A value above one would indicate a potential for adverse effects. This hazard index of 2.9×10^{-4} is also attributable to only soils as there are no present groundwater receptors on or near the Site.

A future use risk scenario was also developed for the Medley Farm site. The future risk scenario assumed residential development of the Site including the installation of potable wells and therefore, consumption of groundwater at the Site would occur. Under this future use scenario, the total risk becomes 1.1×10^{-2} which is greater than the acceptable risk range of 10^{-4} to 10^{-6} . The hazard index under the future residential use scenario becomes 5.6 which is above unity. This future risk is the basis for the remedial action specified in this ROD.

No potential for significant risk to wildlife on the property is expected to occur under present day conditions or under the future residential use scenario.

8.1 CONTAMINANTS OF CONCERN

Table 11 provides a comprehensive list of the contaminants identified as chemicals of potential concern. A contaminant was included in Table 11 if it was detected at or above the CRQL at least once in a given environmental media. Of the 23 chemicals detected at the Site, 17 were identified as chemicals of potential concern. Tables 12 and 13 provide the exposure point concentrations that were used in the risk calculations.

The primary chemical residuals observed in surface soils at the Site are VOCs, which were detected above the CRQL in ten of the surface soil samples. SVOCs were not as widely distributed. They were detected above the CRQL in three samples and below the CRQL in two other samples. PCB-1254 was only detected in three samples and toxaphene in one, in each instance above the CRQL. The extent of site-related chemicals in surface soil is essentially limited to the former disposal area.

Elevated concentrations of VOCs were detected in groundwater samples from 12 of the monitoring wells at the Site; SVOCs, pesticides, and PCBs were not detected above the CRQL. The horizontal extent of site-related chemicals in groundwater appear limited to the former disposal area and immediately downgradient. Vertically, VOCs have been confirmed in both the saprolite and bedrock portions of the aquifer.

8.2 EXPOSURE ASSESSMENT

The populations that potentially may be exposed to site-related chemicals are residents living in the area surrounding the Medley property and trespassers who may enter the property, including hunters and children. The closest potentially exposed individuals consist of the property owners, who live on the Medley property, approximately 100 feet west of the Site. Approximately 300 people live within a one-mile radius.

A complete exposure pathway includes a chemical source/release, retention or transport medium, exposure point, and route of exposure. Two potential human exposure pathways were identified: (1) exposure to site-related chemicals in the groundwater; and (2) exposure to Site soil.

TABLE 11

CHEMICALS OF POTENTIAL CONCERN BY MEDIUM
MEDLEY FARM SITE

	Surface Soil	Ground Water (Saprolite)	Ground Water (Bedrock)
<u>Volatile Organic Compounds</u>			
1,1-Dichloroethene		X	X
1,1-Dichloroethane		X	
1,1,1-Trichloroethane		X	X
1,1,2-Trichloroethane	X	X	
1,1,2,2-Tetrachloroethane	X		
1,2-Dichloroethane			X
1,2-Dichloroethene (total)	X	X	
1,2-Dichloropropane	X		
2-Butanone			X
Acetone			X
Benzene			X
Chloroform			X
Chloromethane		X	
Ethylbenzene	X		
Methylene Chloride	X	X	X
Styrene	X		
Tetrachloroethene	X	X	X
Trichloroethene	X	X	X
Vinyl Chloride	X		
<u>Semi-Volatile Organic Compounds</u>			
1,2,4-Trichlorobenzene	X		
Butylbenzylphthalate	X		
Di-n-butylphthalate	X		
Di-n-octylphthalate	X		
bis(2-Ethylhexyl)phthalate	X		
<u>Pesticides/PCB</u>			
Toxaphene	X		
PCB-1254	X		

X = Chemical detected in that medium

TABLE 12

EXPOSURE POINT CONCENTRATIONS - SURFACE SOIL
MEDLEY FARM SITE

Chemical	Concentration ($\mu\text{g/kg}$)
1,1,2-Trichloroethane	53.7
1,1,2,2-Tetrachloroethane	35.2
1,2-Dichloroethene (Total)	84.1
1,2-Dichloropropane	7.1
Ethylbenzene	10.3
Methylene Chloride	8.4
Styrene	4.6
Tetrachloroethene	28.3
Trichloroethene	25.8
Vinyl Chloride	59.8
1,2,4-Trichlorobenzene	557.9
Butylbenzylphthalate	486.1
Di-n-butylphthalate	397.5
Di-n-octylphthalate	1,696.8
bis (2-Ethylhexyl)phthalate	10,001.1
Toxaphene	164.8
PCB-1254	512.6

Concentrations are the 95 percent upper confidence limit on the arithmetic average of measured concentrations in onsite surface soils.

TABLE 13

EXPOSURE POINT CONCENTRATIONS - GROUND WATER
MEDLEY FARM SITE

Chemical	Concentration (μ g/liter)
1,1-Dichloroethene	1490.60
1,1-Dichloroethane	37.16
1,1,1-Trichloroethane	1636.35
1,1,2-Trichloroethane	5.96
1,2-Dichloroethane	113.66
1,2-Dichloroethene (total)	10.85
Acetone	8.36
Benzene	4.68
2-Butanone	5.79
Chloromethane	7.55
Methylene Chloride	32.68
Tetrachloroethene	107.60
Trichloroethene	327.77

Concentrations are the 95 percent upper confidence limit on the arithmetic average of measured concentrations in ground water wells SW3, SW4, SW109, BW2, BW105, and BW109.

Human exposure to groundwater is of concern with respect to its potential use by local residents as drinking water. Potential exposure points are private wells that may be installed on the Site or downgradient from the Site and off of the property, where ingestion of water would be the route of exposure. There are currently no human receptors for groundwater at the Site nor at the property boundary. There are four private domestic water wells within a one mile radius of the Site (Figure 4). The nearest well, the Sprouse well, is upgradient from the Site. The remaining three are at least one-half mile from the Site and are not directly downgradient. Municipal water supply lines serve much of the area, running along all major roads (refer to Figure 4).

Although there are no current human receptors, a future residential use of groundwater scenario was developed for this Site because the groundwater is classified as a current potable drinking water aquifer by the State of South Carolina.

Potential direct contact with site-related chemicals in surface soil is limited to local residents or unauthorized persons who could possibly enter the Site. Probable exposure routes are through incidental ingestion and dermal absorption. Particulate inhalation is an unlikely route of exposure due to the thick vegetative cover at the Site. Off-site exposure to site-related chemicals is unlikely due to the vegetative cover at the Site which restricts off-site transfer either by overland runoff or atmospheric transport of soil particles. Exposure due to vaporization of site-related chemicals is considered to be minimal due to low concentration of volatile contaminants in the soil and therefore was eliminated as a potential route for exposure.

Other potential pathways for human exposure to site-related chemicals in surface soil are through the food chain. One potential pathway of human exposure is the direct ingestion of blackberries growing at the Site. A second potential pathway of human exposure consists of hunters harvesting and, along with family members, consuming wildlife that have fed on the Site. Wildlife species that might be hunted and consumed include white-tail deer, rabbits and quail. These species could feed on vegetation that may contain site-related chemicals through ingestion or dermal contact. Potential receptors also are limited due to the sparsely populated rural nature of the area. Furthermore, much of the Site is covered by clean fill, thereby limiting potential uptake of site-related chemicals by vegetation. Consequently, these pathways are retained.

Summary of Exposure Pathways for Quantitative Evaluation

- exposure to site-related chemicals in groundwater via ingestion of drinking water; assuming a consumption rate of 2 liters per day, 365 days per year for 30 years.
- contact with site-related chemicals in near-surface Site soils through the ingestion and dermal absorption routes; assuming an ingestion rate of 0.2 grams per day (child) or 0.1 grams per day (adult), 365 days per year for 30 years.

Summary of Exposure Pathways for Qualitative Evaluation

- ° Exposure to site-related chemicals through the food chain

8.3 TOXICITY ASSESSMENT OF CONTAMINANTS

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (milligrams per kilogram-day)⁻¹ {(mg/kg-day)⁻¹}, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. CPFs for the Site contaminants of concern are in Table 14.

Reference Dose (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. RfDs for the Site contaminants of concern are in Table 15.

8.4 RISK CHARACTERIZATION

The risk characterization step of the baseline risk assessment process integrates the toxicity and exposure assessments into quantitative and qualitative expressions of risk. The output of this process is a characterization of the site-related potential noncarcinogenic and carcinogenic health effects.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose.) By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The HI information for the Site contaminants of concern is summarized below:

TABLE 14

TOXICITY VALUES: CARCINOGENIC EFFECTS
CHEMICALS OF CONCERN
MEDLEY FARM SITE

Chemical	Oral Slope Factor (mg/kg/day) ⁻¹	Weight-of Evidence Classification	Source
1,1-Dichloroethene	6.0E-1	C	IRIS
1,1-Dichloroethane	(a)	C	IRIS
1,1,1-Trichloroethane	-	D	IRIS
1,1,2-Trichloroethane	5.7E-2	C	IRIS
1,1,2,2-Tetrachloroethane	2.0E-1	C	IRIS
1,2-Dichloroethane	9.1E-2	B2	IRIS
1,2-Dichloroethene (total)	(b)		IRIS
1,2-Dichloropropane	6.8E-2(a)	B2	HEAST
Acetone	-	D	IRIS
Benzene	2.9E-2	A	IRIS
2-Butanone	-	D	IRIS
Chloroform	6.1E-3	B2	IRIS
Chloromethane	1.3E-2	C	HEAST
Ethylbenzene	-	D	IRIS
Methylene Chloride	7.5E-3	B2	IRIS
Styrene	3.0E-2(a)	B2	HEAST
Tetrachloroethene	5.1E-2(a)	B2	HEAST
Trichloroethene	1.1E-2	B2	HEAST
Vinyl Chloride	2.3E+0	A	HEAST
1,2,4-Trichlorobenzene	-	D	IRIS
Butylbenzylphthalate	ND	C	IRIS
Di-n-butylphthalate	-	D	IRIS
Di-n-octylphthalate	(b)		IRIS
bis(2-Ethylhexyl)phthalate	1.4E-2	B2	IRIS

TABLE 14 (CONTINUED)
TOXICITY VALUES: CARCINOGENIC EFFECTS
CHEMICALS OF CONCERN
MEDLEY FARM SITE

Chemical	Oral Slope Factor (mg/kg/day) ⁻¹	Weight-of Evidence Classification	Source
Toxaphene	1.1E+0	B2	IRIS
PCBs	7.7E+0	B2	IRIS

(a) - Evaluation under review by EPA CRAVE Workgroup

(b) - Not evaluated by EPA

ND - Not determined

IRIS - Integrated Risk Information System (U.S. EPA, 1990c)

HEAST - Health Effects Assessment Summary Tables (U.S. EPA, 1990b)

TABLE 15

TOXICITY VALUES: NONCARCINOGENIC EFFECTS
CHEMICALS OF CONCERN
MEDLEY FARM SITE

Chemical	Chronic Oral RfD (mg/kg/day)	Confidence Level	Critical Effect	Uncertainty and Modifying Factors	Source
1,1-Dichloroethene	9E-3	Medium	Liver effects	UF=1000 for H,A,L MF = 1	IRIS
1,1-Dichloroethane	1E-1			UFxMF = 1000	HEAST
1,1,1-Trichloroethane	9E-2	Low to Medium	Growth retardation	UF=1000 for H,A,S MF=1	IRIS
1,1,2-Trichloroethane	4E-3	Medium	Liver and immunologic effects	UF=1000 for A,S MF=1	IRIS
1,1,2,2-Tetrachloroethane	(a)				IRIS
1,2-Dichloroethane	(b)				IRIS
1,2-Dichloroethene	2E-2		Hematologic effects	UFxMF=100	HEAST
1,2-Dichloropropane	(b)				HEAST
Acetone	1E-1	Low	Liver and kidney effects	UF=1000 for A, S MF=1	IRIS
Benzene	(a)				IRIS
2-Butanone	5E-2	Medium	Fetotoxicity	UF=1000 for A, S MF=1	IRIS
Chloroform	1E-2	Medium	Liver and reproductive effects	UF=1000 for H,A,L MF=1	IRIS
Chloromethane	(b)				

TABLE 15 (CONTINUED)

TOXICITY VALUES: NONCARCINOGENIC EFFECTS
CHEMICALS OF CONCERN
MEDLEY FARM SITE

Chemical	Chronic Oral RfD (mg/kg/day)	Confidence Level	Critical Effect	Uncertainty and Modifying Factors	Source
Ethylbenzene	1E-1	Low	Liver and kidney effects	UF=1000 for A, S MF=1	IRIS
Methylene Chloride	6E-2	Medium	Liver effects	UF=100 for A MF=1	IRIS
Styrene	2E-1	Medium	Hematologic and liver effects	UF=1000 for A,S	IRIS
Tetrachloroethene	1E-2	Medium	Hepatic effects	UF=1000 for A,S MF=1	IRIS
Trichloroethene	(a)				IRIS
Vinyl Chloride	(b)				IRIS
1,2,4-Trichlorobenzene	2E-2(c)		Liver effects	UF x MF=1000	HEAST
Butylbenzylphthalate	2E-1	Low	Liver effects	UF=1000 for A,S MF=1	IRIS
Di-n-butylphthalate	1E-1	Low	Increased mortality	UF=1000 for H, A, S MF=1	IRIS
Di-n-octylphthalate	2E-2		Liver and kidney effects	UF x MF=1000	HEAST
bis(2Ethylhexyl) phthalate	2E-2	Medium	Liver effects	UF=1000 for H,A,S,L MF=1	IRIS

TABLE 15 (CONTINUED)

TOXICITY VALUES: NONCARCINOGENIC EFFECTS
CHEMICALS OF CONCERN
MEDLEY FARM SITE

Chemical	Chronic Oral RfD (mg/kg/day)	Confidence Level	Critical Effect	Uncertainty and Modifying Factors	Source
Toxaphene	(b)				IRIS
PCBs	(b)				IRIS

(a) - Under review by EPA

(b) - Not evaluated by EPA

(c) - Withdrawn from IRIS pending further review

Uncertainty Adjustments:

H = variation in human sensitivity

A = animal to human extrapolation

S = extrapolation from subchronic to chronic NOAEL

L = extrapolation from LOAEL to NOAEL

IRIS - Integrated Risk Information System (U.S. EPA, 1990c)

HEAST - Health Effects Assessment Summary Tables (U.S. EPA, 1990b)

Non-carcinogenic Effects Under Current Conditions

<u>Exposure Pathway</u>	<u>Hazard Quotient</u>
Soil Ingestion	2.6×10^{-5}
Dermal Absorption	2.6×10^{-4}
TOTAL EXPOSURE HAZARD INDEX	2.9×10^{-4}

Non-carcinogenic Effects Under A Future Residential Scenario

<u>Exposure Pathway</u>	<u>Hazard Quotient</u>
Ingestion of Groundwater	5.6
Soil Ingestion	1.4×10^{-3}
Dermal Absorption	4.0×10^{-3}
TOTAL EXPOSURE HAZARD INDEX	5.6

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or $1E-6$). As excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. The excess cancer risk levels associated with the site contaminants and exposure pathways are summarized below.

The Agency considers individual excess cancer risk in the range of 10^{-4} to 10^{-6} as protective; however, the midpoint risk (10^{-6}) is generally used as the point of departure for setting cleanup goals at Superfund sites.

Carcinogenic Effects Under Current Conditions

<u>Exposure Pathway</u>	<u>Risk</u>
Soil Ingestion	7.7×10^{-8}
Dermal Absorption of Soil	7.8×10^{-7}
TOTAL EXPOSURE RISK	8.6×10^{-7}

Carcinogenic Effects Under A Future Residential Scenario

<u>Exposure Pathway</u>	<u>Risk</u>
Ingestion of Groundwater	1.1×10^{-2}
Soil Ingestion	4.2×10^{-6}
Dermal Absorption of Soil	1.1×10^{-5}
<hr/>	
TOTAL EXPOSURE RISK	1.1×10^{-2}

There is no current risk associated with the ingestion of groundwater under baseline conditions since the groundwater plume containing site-related chemicals is presently located within the property boundary and no exposure points exist on the Site or at the property boundary.

The total estimated carcinogenic risk due to soil ingestion is 7.7×10^{-8} . For dermal absorption of chemicals in soil, the total carcinogenic health risk is 7.8×10^{-7} . These risks are mainly the result of the presence of PCBs in the soil. All of these risk levels are within or less than the EPA remediation goals of 10^{-4} to 10^{-6} risk levels. Therefore, the sum of current risks under current, baseline conditions, due to the contamination at the Site is 8.6×10^{-7} or a chance of 8.6 excess cancers in a population of 10,000,000 over a 70-year period.

If the hazard index exceeds unity there may be concern for potential adverse health effects. None of the hazard indices for the three exposure pathways exceeds unity. Adding the hazard indices for all the pathways to exposure to Site-related chemicals yields a total hazard index of 2.9×10^{-4} which is mainly the result of the presence of bis (2-ethylhexyl) phthalate. This sum is approximately four orders of magnitude below unity, thus there is no concern for potential non-carcinogenic health effects under present day Site conditions.

For the future on-site residential use scenario, estimated carcinogenic risk due to exposure to site-related chemicals is 1.1×10^{-2} for all pathways combined as can be seen below. Virtually all of the risk is from ingestion of groundwater containing 1,1-dichloroethylene. The risk level from direct contact with soil is 4.2×10^{-6} for soil ingestion and 1.2×10^{-5} for dermal absorption of chemicals in soil, both of which are within the remediation level goals of 10^{-4} to 10^{-6} . These risk levels are mainly the result of the presence of PCBs in the soils. The total non-carcinogenic hazard for future residential use of the Site is estimated to be 5.6 which exceeds unity. Ingestion of groundwater containing 1,1-dichloroethylene is responsible for virtually all of the non-carcinogenic hazard. Hazard indices for soil ingestion, 1.4×10^{-3} , and dermal contact with soil, 4.0×10^{-3} , are both less than one, indicating that there is no concern for potential health effects from direct contact with residual on-site soil contamination. Virtually all of the HI for soils results from the presence of bis (2-ethylhexyl) phthalate.

Although residual on-site soil contamination does not pose a direct threat to either human health or the environment, this residual on-site soil contamination does pose a indirect threat to human health as shown above by an estimated carcinogenic risk of 1.1×10^{-2} and non-carcinogenic hazard of 5.6. This indirect risk will persist until such time as the mass of contaminants in the unsaturated soil is reduced to a point where they will no longer adversely impact groundwater quality above MCLs.

Uncertainty:

The estimates of human health risks developed in the baseline risks assessment required a considerable number of assumptions about exposure and adverse human health effects.

8.5 ENVIRONMENTAL RISKS

Exposure to groundwater and soils containing site-related chemicals are potential sources of environmental endangerment. As stated previously, exposure to groundwater at the Site is not a present pathway of concern because the groundwater plume containing site-related chemicals is presently confined to the Site and no exposure points exist. The potential for endangerment of the flora and fauna of Jones Creek, the stream along the eastern end of the property, could exist if groundwater containing site-related chemicals entered this stream. However, no site-related chemicals were detected in the stream water samples, the sediment samples, or the monitoring wells closest to Jones Creek.

Because much of the Site has been covered with clean fill and is covered with vegetation, exposure of terrestrial animals to soil by dermal contact and ingestion is considered unlikely. Ingestion of plants potentially containing site-related chemicals is minimized because of the clean fill covering much of the Site. For species with large home ranges (e.g. deer), ingestion of plants growing on the Site will represent only a portion of their diets, thus further minimizing their intake of site-related chemicals. In summary, no potential for significant risk to wildlife population on or adjacent to the Site was identified. Furthermore, no endangered species or critical habitats are known to occur in the vicinity of the Site.

9.0 DESCRIPTION OF ALTERNATIVES

Tables 16 and 17 summarize the technologies considered for remediating/controlling groundwater and source contamination, respectively at the Medley Farm site. These tables also provide the rationale as to why certain technologies were not retained for further consideration after the initial screening. Surface water/sediment remediation technologies were not evaluated as this environmental medium has not been impacted by the Site nor is it expected to be in the future. Although air is not a present exposure pathway, it may pose a risk during the implementation of either the groundwater treatment system or during the remediation of the soils. Any potential impact on air will be considered along with the description of each individual remedial alternative.

TABLE 16
GROUND WATER CONTROL
TECHNOLOGY SUMMARY

TECHNOLOGY	STATUS	REASON
<u>GROUNDWATER RECOVERY</u>		
EXTRACTION WELLS	RETAINED	
SUBSURFACE DRAINS/ INTERCEPTION TRENCHES	REJECTED	CANNOT BE INSTALLED AT DEPTH IN BEDROCK
ACLs	REJECTED	SITE CONDITIONS NOT APPROPRIATE
NO ACTION	RETAINED	
<u>GROUNDWATER TREATMENT</u>		
ACTIVATED CARBON ADSORPTION	RETAINED	
CHEMICAL OXIDATION	RETAINED	
BIOLOGICAL SYSTEM	REJECTED	CHLORINATED VOCs RESISTANT TO BIODEGRADATION
AIR STRIPPING	RETAINED	
LAND APPLICATION	REJECTED	RESISTANT COMPOUNDS, SEASONAL USE
<u>GROUNDWATER DISCHARGE</u>		
SURFACE WATER (JONES CREEK)	RETAINED	
GAFFNEY POTW	REJECTED	DISTANCE TO SERVICE
INFILTRATION GALLERY	RETAINED	PROVISIONALLY DEPENDING ON APPLICATION RATES
INJECTION WELL	RETAINED	PROVISIONALLY DEPENDING ON APPLICATION RATES

TABLE 17
SOURCE CONTROL
TECHNOLOGY SUMMARY

	TECHNOLOGY	STATUS	REASON
DIRECT TREATMENT	BIOREACTOR	REJECTED	EXCAVATION OF SITE TO REQUIRED DEPTH IS CONSIDERED INFEASIBLE
	LAND TREATMENT	REJECTED	
	SOIL WASHING	REJECTED	
	CEMENT-BASED STABILIZATION	REJECTED	
	SILICATE-BASED STABILIZATION	REJECTED	
	PROPRIETARY CHEMICAL FIXATION	REJECTED	
	LOW-TEMPERATURE DESORPTION	REJECTED	
	ROTARY KILNS	REJECTED	
	INFRARED THERMAL TREATMENT	REJECTED	
	FLUIDIZED BED INCINERATION	REJECTED	
IN-SITU TREATMENT	ENHANCED BIODEGREDEATION	REJECTED	PERMEABILITY, DEPTH OF SOILS
	SOIL FLUSHING	REJECTED	
	SOIL VAPOR EXTRACTION	RETAINED	FAILED EPA FIELD TEST, SOIL PERMEABILITY
	VITRIFICATION	REJECTED	
			NOT SUFFICIENTLY DEMONSTRATED
OFF-SITE TMT/DISP	COMMERCIAL LANDFILLING	REJECTED	EXCAVATION OF SITE TO REQUIRED DEPTH IS CONSIDERED INFEASIBLE
	COMMERCIAL INCINERATION	REJECTED	
CONTAINMENT	CAPPING	RETAINED	FRACTURED BEDROCK PREVENTS EFFECTIVE USE CANNOT BE EFFECTIVELY APPLIED NOT APPLICABLE TO ROCKY SOILS, DEPTHS NOT FULLY DEVELOPED
	SLURRY WALLS	REJECTED	
	GROUTING	REJECTED	
	SHEET PILING	REJECTED	
	BOTTOM SEALING	REJECTED	
NO ACTION		RETAINED	

9.1 REMEDIAL ALTERNATIVES TO ADDRESS GROUNDWATER CONTAMINATION

Four sets of alternatives were developed to address groundwater contamination at the Site. The four groundwater control (GWC) remedial alternatives are:

- GWC-1: No Action
- GWC-2: Long-Term Monitoring and Institutional Control
- GWC-3: Recovery and Treatment of Groundwater Across Entire Site
- GWC-4: Recovery and Treatment of Groundwater at the Medley Farm Property Line.

Both Alternatives GWC-3 and GWC-4 have a subset of corresponding treatment approaches for the extracted groundwater. These alternatives and their associated treatments are described below.

9.1.1 GWC-1: No Action

The No Action alternative is included, as required by CERCLA and the NCP, to serve as a baseline for comparison with other groundwater control measures. This alternative would not involve any treatment or other remedial actions. The description of this alternative is included in the following section.

9.1.2 GWC-2: Long-Term Monitoring and Deed Restriction

This alternative is identical to GWC-1 but includes long-term monitoring of Site groundwater and the placement of a deed restriction to reduce the potential for the construction of potable wells on the property.

In Alternatives GWC-1 and GWC-2, Site conditions would remain unchanged. Slight remediation of contaminated groundwater may occur through natural processes such as bioremediation, adsorption, and dilution. Therefore, levels of groundwater contamination would remain above MCLs for a minimum of 20 years.

Implementation of Alternative GWC-1 could begin immediately and would have no negative impacts of future remedial actions. Operating costs would be incurred because of the mandatory review every five years. Implementation of Alternative GWC-2 may be delayed approximately one month as this approach may include the installation of additional monitoring wells. In addition, under GWC-2, a deed restriction would be placed on the property in an attempt to limit the future use of the groundwater. Capital costs for GWC-2 would be incurred for monitoring well construction; operating costs would include periodic groundwater sampling, chemical analysis, and reviewing and documenting Site conditions every five years; maintenance costs would be incurred for inspection of the monitoring wells.

Estimated Period of Operation: 30 years

Estimated Total Cost (net present worth):

Alternative GWC-1 \$140,000

Alternative GWC-2 \$790,000.

9.1.3 GWC-3: Recovery of Groundwater Across Entire Site

This alternative considers the entire Site as the point of compliance; therefore, under this alternative all groundwater exceeding MCLs at the Site will be recovered through a system of extraction wells. The Site is delineated by the extent of contamination in the groundwater.

The treatment system for the extracted groundwater would involve installing piping from each extraction well to a common treatment area, a specific treatment system, and discharging the treated groundwater. The estimated hydraulic flow for Option GWC-3 is 30 gallons per minute (gpm). Below are descriptions of three treatment options evaluated for treating the extracted groundwater for Option GWC-3. Figure 22 provides the tentative locations for the extraction wells, identified by circles with a dot in their middle, for this alternative.

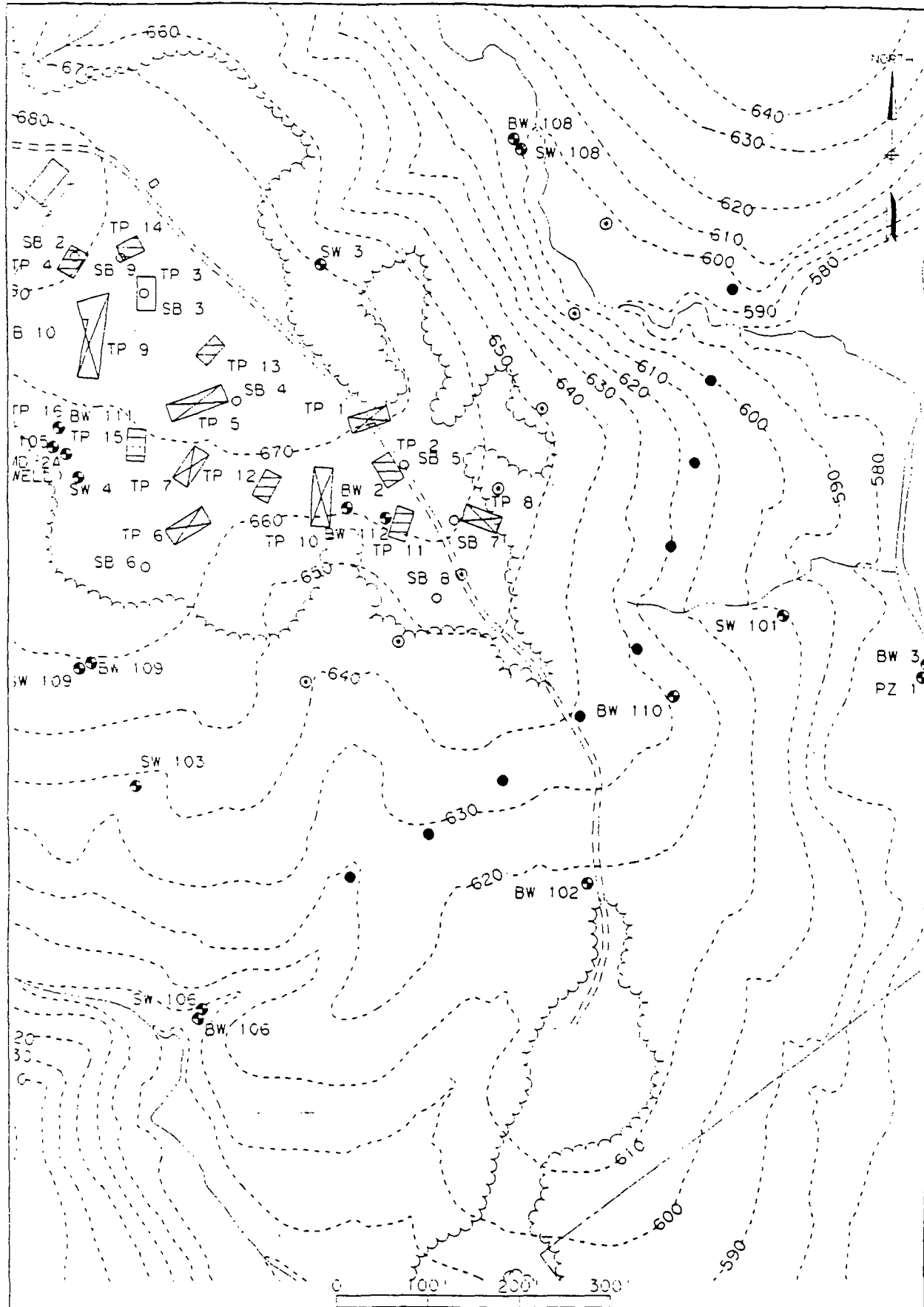
Of the four (4) discharge options retained after the initial screening discharging to Jones Creek via an NPDES discharge permit is the preferred discharge option (refer to Table 16). Discharging to the local publicly owned treatment works (POTW) was rejected due to the distance to the nearest hook up point. Both infiltration galleries and injection wells are technically feasible, but their usefulness is dependent on application rates of the discharge effluent. Therefore, all of the groundwater remediation alternatives discussed below will discharge treated groundwater is to Jones Creek via an NPDES permit.

9.1.3.1 GWC-3A: Recovery and Treatment of Groundwater Across Entire Site Using an Air Stripping Tower

Air stripping is a mass transfer process in which volatile compounds in a water column are transferred to an air stream within a packed tower. The air stripping tower will remove the volatile compounds to below quantitation limits. The maximum air emission rate for VOCs would be approximately 44 pounds per month. South Carolina Air Pollution Control Regulation (No. 62.1, Section II, F.2g) states that VOC sources of less than 1,000 pounds per month may not require permits but that source information must be supplied to the Department. SCDHEC policy states that any source of air toxics must be reviewed for potential impact to receptors. To satisfy South Carolina requirements, calculated airborne concentrations at the stack were compared with allowable State ambient concentration levels Air Pollution Control Regulation (No. 62.5, Standard No. 8, Toxic Air Pollutants). The results of an air dispersion model conducted to estimate the airborne concentrations at the property line found that the contaminant levels would be below allowable State levels by a factor of more than 1,000. Maximum air stripper emissions from the Medley Farm site would therefore be protective of human health and would not require control.

Estimated Period of Operation: 30 years

Estimated Total Cost (net present worth): \$1,900,000.



- ⊙ Alternative GWC-3 Anticipated Arrangement of Extraction Wells
- Alternative GWC-4 Anticipated Arrangement of Extraction Wells

FIGURE 22
POTENTIAL GROUNDWATER
RECOVERY SCHEMES
MEDLEY FARM SITE

9.1.3.2 GWC-3B: Recovery and Treatment of Groundwater Across Entire Site
Using Activated Carbon

In the carbon adsorption system, the contaminated groundwater is forced through tanks containing activated carbon. Activated carbon is specially-treated material that naturally attracts the molecules of contaminating chemicals. As the groundwater moves through the filters, the contaminants cling to the carbon and the groundwater is cleansed as it leaves the system. The cost of replacing or reactivating the activated carbon so that it retains its effectiveness makes this option more costly to implement than GWC-3A.

Estimated Period of Operation: 30 years

Estimated Total Cost (net present worth): \$2,500,000.

9.1.3.3 GWC-3C: Recovery and Treatment of Groundwater Across Entire Site
Using Chemical Oxidation

Chemical oxidation is a process by which organic compounds, such as VOCs and SVOCs, are broken down into carbon dioxide and water. Oxidation can be achieved through a range of technologies.

Estimated Period of Operation: 30 years

Estimated Total Cost (net present worth): \$2,500,000.

9.1.4 GWC-4: Recovery and Treatment of Groundwater at the Medley Farm
Property Line

This alternative is designed to address groundwater contamination at the property line of the Medley Farm and not beneath the entire Site. Using the same range of treatment for extracted groundwater as described above in Section 9.1.3, this alternative focuses on removing groundwater from the perimeter of the property. The anticipated flow rate for this alternative is 15 gpm. The point of compliance for this alternative is the Medley Farm property line. Therefore, this alternative would insure that levels of contaminants in the groundwater would not exceed MCLs at the property line of the Medley Farm as presently owned by Mr. Ralph Medley. This alternative would allow contaminants to remain above MCLs in the groundwater beneath and just downgradient of the disposal area. The extraction wells represented by solid circles in Figure 22 correspond to Alternative GWC-4.

This alternative is protective under present day conditions as there are no receptors using the contaminated groundwater. However, this alternative would not be protective of future use of the aquifer in the event that a residence is built in the vicinity of the Site and the owner of such residence installs a potable well near or downgradient of the Site. The cost estimate for each of the treatment schemes discussed as part of Alternative GWC-4 are stated below:

Estimated Period of Operation: 30 years

Estimated Total Cost (net present worth):

GWC-4A (Air Stripping) : \$1,300,000

GWC-4B (Carbon Adsorption): \$1,900,000

GWC-4C (Chemical Oxidation): \$1,800,000.

9.2 REMEDIAL ALTERNATIVES TO ADDRESS SOURCE CONTROL

The following remedial action alternatives address contaminant source areas that are (1) currently accessible to the public, (2) may become accessible during the remedial action, or (3) act as a continuing source of contamination to groundwater at the Medley Farm site. These source areas must be remediated to the extent necessary to reduce the risks attendant to exposure to chemical residuals, or they must be isolated to prevent exposure. The four response actions to address source control (SC) at the Medley Farm Site are:

- SC-1: No Action
- SC-2: Institutional Controls
- SC-3: Cap Source Areas
- SC-4: Soil Vapor Extraction

Below are descriptions of each of the source control/remediation alternatives.

9.2.1 SC-1 No Action

In the No Action alternative, no further remedial action would occur. A slight reduction in the levels of the contaminants present may occur through natural processes; and short-term effectiveness presents no additional risks to the community or the environment. This alternative would not significantly reduce the toxicity, mobility, or volume of contaminants at the Site. Long-term effectiveness and permanence of this alternative would be reviewed every five years as required by Section 121(c) of CERCLA. Site soils would not change significantly over time and would likely continue to contribute chemicals to the groundwater above MCLs for up to 20 years.

The Baseline Risk Assessment under current conditions indicates that this alternative would be protective of human health and the environment. The current risk posed by Site under today's conditions is 8.6×10^{-7} . The Toxic Substances Control Act (TSCA) establishes remediation levels for PCBs in areas of unrestricted access, and the levels of PCBs encountered at the Site are below the action level of 10 ppm.

However, under the future use scenario, the Site would pose a significant risk. The risk, 1.1×10^{-2} , is mainly the result of using the contaminated aquifer beneath the Site for potable water. As in the risk assessment for current conditions, soils, under the future use scenario, do not pose a significant risk to human health.

The No Action alternative could be readily implemented, and would not hinder any future remedial actions. There are no construction costs associated with this alternative. However, operation and maintenance (O&M) costs would involve review of the remedy every five years.

Estimated Period of Operation: 30 years

Total Construction Costs:	\$0
Estimated Present Worth O&M Costs:	<u>\$140,000</u>
Estimated Total Costs (net present worth):	\$140,000

9.2.2 SC-2: Institutional Controls

Alternative SC-2 is similar to Alternative SC-1 but includes the additional requirement of initiating institutional controls. Under this alternative, deed restrictions would be placed on the Medley property in an attempt to control future use of the property and prevent inadvertent exposure to chemical residuals.

Estimated Period of Operation: 30 years

Total Construction Costs:	\$0
Estimated Present Worth O&M Costs:	<u>\$140,000</u>
Estimated Total Costs (net present worth):	\$140,000

9.2.3 SC-3: Cap Source Areas

This alternative involves construction and operation of a low permeability cap over Site soils. Capping is the covering of contaminated wastes or soils. In this approach, a layer of compacted soil would be used to cover the area; this layer would be covered with an impermeable synthetic liner to prevent wind, rain, and melting snow from carrying contaminants beyond their primary location. This approach would also prevent direct human and animal contact with contaminants. The finished cap would be covered with soil and seeded for erosion control and to make it blend into the landscape. Maintenance is minimal, requiring periodic inspections and the filling of cracks or depressions, if they appear.

Construction of a cap would involve heavy earth moving and grading equipment and the clearing of vegetation. Existing Site access would probably have to be improved. Dust control measures would be taken to minimize short term potential release of airborne particulates. In the implementation of this option, groundwater observation wells not required for long-term monitoring would be abandoned. Drainage swells and a security fence would be constructed along the cap perimeter. Deed restrictions would be included in the implementation of this alternative in an attempt to control future use of the Site.

There are no ARARs for capping at the Site, and Resource Conservation and Recovery Act (RCRA) disposal requirements are not applicable; however, the single synthetic liner cap design would meet an equivalent standard of performance to RCRA requirements.

Long-term effectiveness and permanence of this approach would rely on regular inspections to ensure the reliability of the cap; an inspection and maintenance schedule would be implemented following construction and continue as long as chemical residuals remained at the Site. Evaluation of cap effectiveness would be performed through periodic groundwater monitoring. If deemed necessary during the design phase, gas vents will be incorporated into the cap. Because residuals would remain at the Site, CERCLA Section 121(c) requires a review of effectiveness and protectiveness be made every five years.

Implementation of this alternative would not offer any reduction in toxicity or volume of chemicals at the Site. Use of an impermeable layer to limit the exposure of contaminants would help control migration if this alternative were employed in conjunction with one of the groundwater control options.

Operating cost would be incurred to maintain the cap and to develop reports and reviews of the Site remedy every five years. Biannual sampling would be conducted under this alternative.

Estimated Period of Operation: 30 years

Estimated Total Construction Costs:	\$580,000
Estimated Present Worth O&M Costs:	<u>\$420,000</u>
Estimated Total Cost (net present worth):	\$1,000,000

9.2.4 SC-4: Soil Vapor Extraction

Source areas with chemical levels exceeding calculated levels that are protective of the groundwater would be remediated through soil vapor extraction (SVE). These calculated subsurface soil levels are based on a compound's potential to impact groundwater above promulgated standards. A leach model incorporating site-specific physical properties and environmental fate considerations were used. The factors used were: annual infiltration; chemical retardation; fate mechanisms volatilization, biodegradation, hydrolysis; soil type and properties; and groundwater flow.

Figure 23 identifies the areas of the Site where levels of residual soil contamination exceed the calculated concentrations that would be protective of the underlying aquifer. These concentrations are based on a leaching model which would protect the groundwater from being impacted above MCLs. The model takes the following parameters into consideration: infiltration, equilibrium, chemical partitioning, groundwater ARARs, and mixing of infiltration with groundwater. The calculated concentrations of volatile organics in the unsaturated subsurface soils that will be protective of Site groundwater to MCLs are presented in Table 18. This table also lists the locations where these soil remediation levels were exceeded.

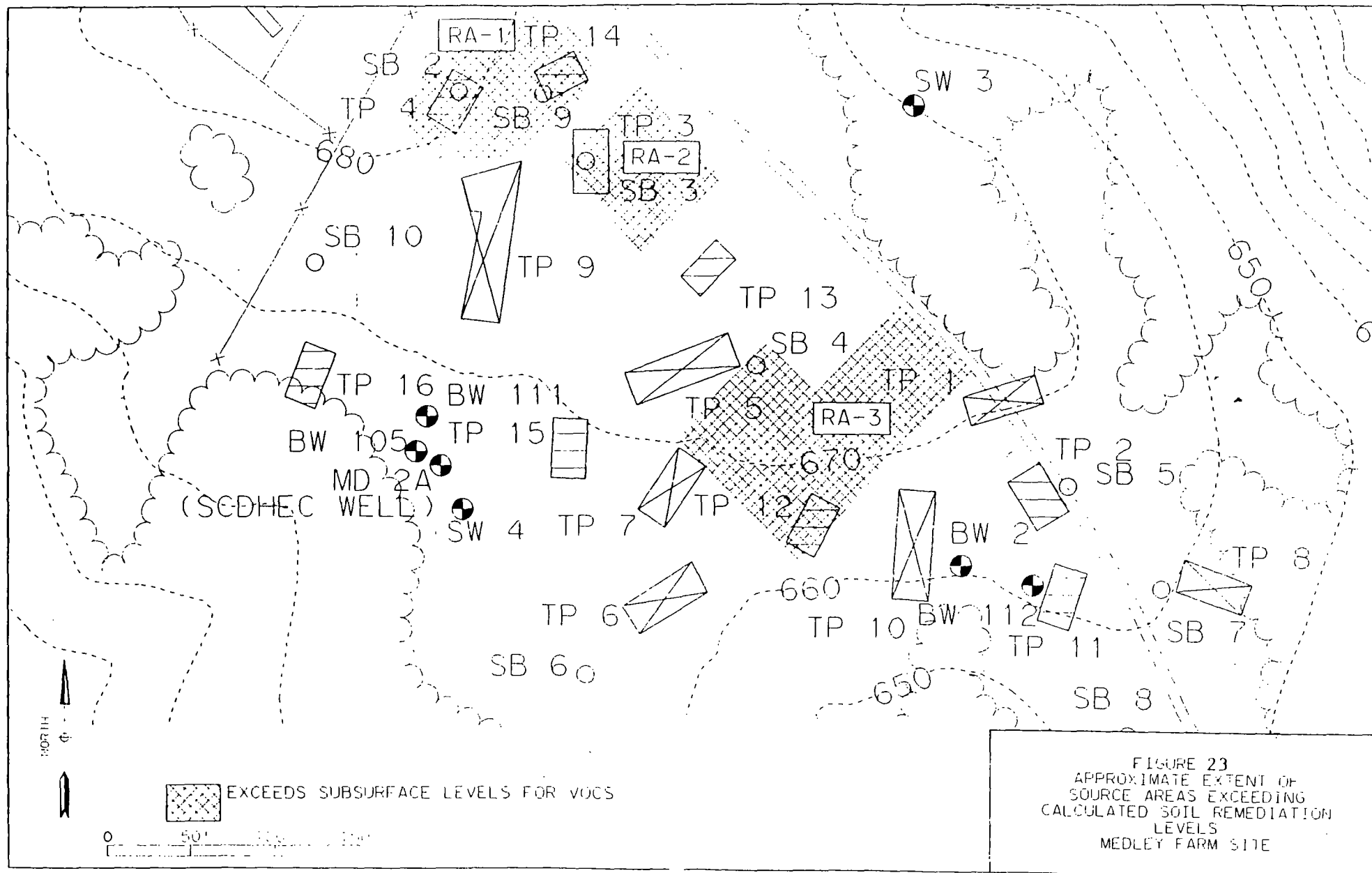


FIGURE 23
 APPROXIMATE EXTENT OF
 SOURCE AREAS EXCEEDING
 CALCULATED SOIL REMEDIATION
 LEVELS
 MEDLEY FARM SITE

TABLE 18

POTENTIAL VOLATILE ORGANIC SOIL REMEDIATION LEVELS
MEDLEY FARM SITE

<u>Compound</u>	<u>Soil Remediation Level (ug/kg)</u>	<u>Locations Where Remediation Level Exceeded</u>
Acetone	12,000	(SB2)
1,1-Dichloroethane	100	None
1,2-Dichloroethane	60	TP12, SB4, (SB7), SB9
1,1-Dichloroethene	270	None
1,2-Dichloroethene (total)	2,100	TP3
1,1,1-Trichloroethane	26,000	None
1,1,2-Trichloroethane	160	None
Trichloroethene	500	TP3, TP4
Tetrachloroethene	1,600	TP3, TP4
Chloroform	3,000	None
Methylene chloride	40	TP4, (SB3)

NOTE: Locations given in parentheses are considered a minimal risk to ground water based on site-specific conditions.

SVE typically includes a series of slotted vertical injection vents connected by a common manifold to an extraction pump or blower. Volatile compounds and some SVOC's are withdrawn through an induced pressure gradient in the subsurface. Air emissions from the SVE system may require treatment, such as being scrubbed or sent through an activated carbon filter, prior to being vented to the atmosphere. The need for an emission control would be determined during the design. Upon completion of SVE activities, there would no longer be a significant source of chemicals to impact groundwater quality above the identified ARARs. The costs below anticipate that an air emission control system will be required.

Estimated Period of Operation: 1 year

Estimated Total Construction Costs:	\$260,000
Estimated Present Worth O&M Costs:	<u>\$360,000</u>
Estimated Total Cost (net present worth):	\$620,000

9.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The environmental setting and the extent and characteristics of the contamination at the Medley Farm Site were defined in Section 7.0. Section 8.0 highlights the primary environmental media of and the human health and environmental risks posed by the Medley Farm site. Table 11 lists the contaminants of concern present in the groundwater and soils at the Site. This Section examines the cleanup criteria (ARARs) associated with the contaminants found on-site and the environmental media contaminated.

9.3.1 Action-Specific ARARs

Action-specific requirements set controls/restrictions on the design, performance, and other aspects for implementing a specific remedial activity. Since action-specific ARARs apply to discrete remedial activities, they are discussed in greater detail in Section 10.0. The three categories for action-specific ARARs are:

- ARARs for actions taken in all alternatives;
- ARARs for an action involving soil treatment; and
- ARARs for an action involving groundwater treatment.

The first category specifies requirements for safety and health, hazardous waste facilities, and transportation. The second category covers soil vapor extraction, capping, and related air emissions. The last category applies to the extraction and treatment of groundwater, the discharge of the treated groundwater, and related air emissions.

9.3.2 Chemical-Specific ARARs

Chemical-specific ARARs are concentration limits established by government agencies for a number of contaminants in the environment. Chemical-specific ARARs can also be derived in the Risk Assessment. Discussed below is each environmental medium investigated at the Medley Farm site as part of the RI and the associated chemical-specific ARARs.

9.3.2.1 Groundwater

Groundwater at the Medley Farm site is designated as Class GB in accordance with the South Carolina water classification system and Class IIA under USEPA Groundwater Classification Guidelines (December 1986). The Class GB classification means that all groundwater meeting the definition of underground sources of drinking water meet quality standards set forth in the State Primary Drinking Water Regulation (R.61-58.5). EPA classifies the groundwater as Class IIA since the aquifer was and is being used as a source of drinking water. Therefore, the groundwater needs to be remediated to a level protective of public health and the environment as specified in Federal and State regulations governing the quality and use of drinking water.

The Safe Drinking Water Act and the State Primary Water Regulations establish MCLs and non-zero maximum contaminant level goals (MCLGs) for numerous organic and inorganic constituents. The Cleanup Criteria shown in Table 19 were established based on MCLs, proposed MCLs and MCLGs. Where MCLs were not available, risk based numbers were calculated as indicated by the appropriate table footnotes.

9.3.2.2 Surface Soils

The baseline risk assessment considered both present day conditions as well as a future risk scenario involving the construction of a residence on the Site at some time in the future. Under both scenarios, it was determined that the cumulative chemical concentrations of surficial soils at the Site do not pose a significant risk to human health; therefore, concentrations of individual chemicals would not present significant risks. Consequently, specific remediation levels for surficial soils were not developed.

The only contaminant detected in surface soil samples at the Site for which there is a promulgated Federal or State standard is PCBs. The promulgated standard of 10 milligrams/kilogram (mg/kg) for PCBs in areas of unrestricted access is specified in the TSCA (40 C.F.R. 761.125). Concentrations of PCBs detected in surface soil samples were all below 10 mg/kg. PCB levels at the Site are therefore in compliance with this ARAR.

Compound	Maximum Concentration (ug/L)	Well	Remediation Level (ug/L)	Source
Acetone	18	BW2	350	(1)
Benzene	11	BW105	5	MCL
2-Butanone	13	BW106	2000	(1)
Chloromethane	26	BW108	63	(2)
Chloroform	10	BW2	100	MCL
1,1-Dichloroethane	120	SW4	350	(3)
1,2-Dichloroethane	290	BW2	5	MCL
1,1-Dichloroethene	2200	SW4	7	MCL
1,2-Dichloroethene	31	SW4	cis: 70 trans: 100	MCL MCL
Methylene Chloride	110	BW2	5	pMCL
Tetrachloroethene	200	SW3	5	MCL
1,1,1-Trichloroethane	3400	SW4	200	MCL
1,1,2-Trichloroethane	18	BW4	5	pMCL
Trichloroethene	720	BW2	5	MCL

MCL Safe Drinking Water Act Maximum Contaminant Level (40 CFR Parts 141.61)

- (1) Remediation level derived from EPA's Reference Dose (RfD).
- (2) Remediation level represents a one in one hundred thousand excess cancer risk, chloromethane is a Class C carcinogen
- (3) Remediation level derived from EPA's Reference Dose (RfD) with an additional 10-fold safety factor. 1,1-dichloroethane is a Class C carcinogen.

pMCL = Proposed Maximum Contaminant Level (55 FR 30370)

TABLE 19 POTENTIAL GROUND-WATER REMEDIATION LEVELS

9.3.2.3 Subsurface Soils

As specified in the Administrative Record, the levels of contaminants in the unsaturated subsurface soils will continue to adversely impact groundwater quality for an estimated 20 years. Therefore, the remediation levels for contaminants found in the unsaturated soils were calculated. These remediation levels would protect the groundwater from being impacted above MCLs. These calculations were based on a leaching model. The remediation goals for volatile organics in the unsaturated subsurface soils which would be protective of Site groundwater to MCLs are presented in Table 18.

9.3.2.4 Surface Waters

The RI determined that Jones Creek has not been impacted by any site-related chemicals. Therefore surface waters are not in violation of the Federal Ambient Water Quality Criteria (AWQC; EPA, 1986). This ARAR protects aquatic organisms.

Any discharge from a groundwater extraction and treatment system will be discharged to Jones Creek via a NPDES discharge permit.

9.3.2.5 Sediments

There are no promulgated Federal or State quality standards for sediments. No site-related chemicals were detected in sediment samples collected from Jones Creek during the RI. Accordingly, sediment quality criteria are not necessary.

9.3.3 Location-Specific ARARs

Location-specific ARARs consider Federal, State, and local requirements that reflect the physiognomical and environmental characteristics of the Site or the immediate area. Table 20 lists the location-specific ARARs that apply at the Medley Farm Site.

10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 21 lists the remedial alternatives that were considered in the detailed analysis of alternatives. This section summarizes the evaluation of these remedial alternatives as specified in the NCP.

10.1 THRESHOLD CRITERIA

An alternative must overall, be protective both of human health and the environment and comply with ARARs, unless waived, in order to be eligible for selection. If an alternative fails to protect human health or the

TABLE 20
POTENTIAL LOCATION - SPECIFIC ARARs
MEDLEY FARM SITE

<u>SITE FEATURE/LOCATION</u>	<u>CITATION</u>	<u>REQUIREMENT SYNOPSIS</u>	<u>CONSIDERATION IN THIS FS</u>
FEDERAL			
Within 61 meters (200 feet) of a fault displaced in Honocene time	40 CFR 264.18(a)	New treatment, storage, or disposal of hazardous waste prohibited; applies to RCRA hazardous waste; treatment, storage, or disposal.	Not an ARAR since Site is not within 200 feet of a fault displaced in Honocene time.
Within 100-year flood plain	40 CFR 264.18(b)	Facility must be designed, constructed, operated, and maintained to avoid washout; applies to RCRA hazardous waste; treatment, stored, or disposal.	Not an ARAR since Site is not in a 100-year flood plain.
Within flood plain	Protection of floodplains (40 CFR 6, Appendix A); Fish and Wildlife Coordination Act (16 USC 661 et seq.); 40 CFR 6.302; Flood plains Executive Order (EO 11988)	Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values; applies to action that will occur in a flood plain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood prone areas.	Not an ARAR since Site is not in a flood plain.
Within area where action may cause irreparable harm, loss or destruction of significant artifacts	National Historical Preservation Act (16 USC Section 469); 36 CFR Part 65	Requires that action be taken to recover and preserve artifacts when alteration of terrain threatens significant scientific, prehistorical, historical, or archaeological data.	Not an ARAR since Site is not a designated archaeological area.

TABLE 20 (CONTINUED)
POTENTIAL LOCATION - SPECIFIC ARARs

<u>SITE FEATURE/LOCATION</u>	<u>CITATION</u>	<u>REQUIREMENT SYNOPSIS</u>	<u>CONSIDERATION IN THIS FS</u>
Critical habitat upon which endangered species or threatened species depends	Endangered Species Act of 1973 (16 USC 1531 <u>et seq.</u>); 50 CFR Part 200, 50 CFR Part 402; Fish and Wildlife Coordination Act (16 USC 661 <u>et seq.</u>); 33 CFR Parts 320-330	If endangered or threatened species are present, action must be taken to conserve endangered or threatened species, including consultation with the Department of Interior.	Not an ARAR since Site does not have endangered or threatened species.
Wetlands	Clean Water Act Section 404; 40 CFR Part 230, 33 CFR Parts 320-330	For wetlands as defined by U.S. Army Corps of Engineers regulations, must take action to prohibit discharge of dredged or fill material into wetlands without permit.	Not an ARAR since Site is not in a wetlands area and no bodies of water or wetlands are to be modified.
	40 CFR Part 6, Appendix A	For action involving construction of facilities or management of property in wetlands (as defined by 40 CFR Part 6, Appendix A, section 4(j)), action must be taken to avoid adverse effects, minimize potential harm, and preserve and enhance wetlands, to the extent possible.	Not an ARAR since Site is not in a wetlands area.
Wilderness area	Wilderness Act (16 USC 1131 <u>et seq.</u>); 50 CFR 35.1 <u>et seq.</u>	For Federally-owned area designated as wilderness area, the area must be administered in such manner as will leave it unimpaired as wilderness and to preserve its wilderness.	Not an ARAR since Site is not in a wilderness area.
Within area affecting national wild, scenic, or recreational river	Wild and Scenic Rivers Act (16 USC 1271 <u>et seq.</u>); section 7 (a)); 40 CFR 6.302(e)	For activities that affect or may affect any of the rivers specified in section 1271(a), must avoid taking or assisting in action that will have direct adverse effect on scenic river.	Not an ARAR since Site is not on or near a scenic river.

environment, or does not comply with ARARs, then this alternative cannot be selected. Below is a discussion of the screened alternatives in comparison with the threshold criteria.

GROUNDWATER CONTROL	DESCRIPTION
GWC-1	No action
GWC-2	Institutional Controls/Long-term monitoring
GWC-3	MCLs across the Site
GWC-4	MCLs at the property line

SOURCE CONTROL	DESCRIPTION
SC-1	No action
SC-2	Institutional Controls
SC-3	Cap source areas
SC-4	Soil vapor extraction of source areas

TABLE 21 RETAINED ALTERNATIVES FOR DETAILED ANALYSIS

10.1.1 Overall Protection of Human Health and the Environment

This criterion assesses the alternatives to determine whether they can adequately protect human health and the environment from unacceptable risks posed by the Site. This assessment considers both the short-term and long-term time frames.

Alternative GWC-1 would be protective of human health and the environment under present conditions as there are no current receptors. However, this alternative would not be protective of human health in the event that the Medley Farm property was developed into a residential area in the future. Under this scenario, it is assumed that any such residents would install potable wells. As can be seen in Tables 9 and 10, a number of contaminants in the groundwater are above MCLs.

Alternative GWC-2 is an extension of Alternative GWC-1 but this alternative involves the use of institutional controls, such as deed restrictions, in an attempt to reduce the potential for the installation of a potable well on the Site in the future. The remainder of the evaluation for Alternative GWC-2 under this criterion would be the same as for Alternative GWC-1.

TABLE 20 (CONTINUED)
POTENTIAL LOCATION - SPECIFIC ARARs

<u>SITE FEATURE/LOCATION</u>	<u>CITATION</u>	<u>REQUIREMENT SYNOPSIS</u>	<u>CONSIDERATION IN THIS FS</u>
Classification and potential use of an aquifer	* Guidelines for Ground Water Classification, EPA Ground Water Protection Strategy. (USEPA, 1984; USEPA, 1986)	Consider Federal and State aquifer classifications in the assessment of remedial response objectives.	TBC since drinking water wells have been installed and used in the vicinity of the Site. Note that this is not an ARAR but is USEPA policy and therefore falls into the category of other criteria or guidelines to be considered (TBC).

STATE

Within 100-year flood plain	S.C. R.61.264.18 (b)	Facility located within a 100-year flood plain must be designed, constructed, and maintained to permit washout of any waste materials.	Not an ARAR since Site is not in a 100-year flood plain.
Wetlands	S.C. Pollution Control Act	Facility must not be located in a wetland.	Not an ARAR since Site is not in a wetlands area.

Alternative GWC-3 would remediate all groundwater at the Site to MCLs which would be protective of human health in the future while Alternative GWC-4 was designed to achieve MCLs at the Medley Farm property line. Under present conditions, these alternatives would be protective since there are no receptors. However, under a future residential use scenario, GWC-4 would not be protective of human health and GWC-3 would be protective of human health.

As documented in the Baseline Risk Assessment, Site soils do not represent a significant risk to human health. Risks from soils to populations of either flora or fauna could not be quantified but are limited because most of the surface soil is clean fill which effectively reduces exposure via direct contact to the residual contaminants in the unsaturated, subsurface soils at the Site. Exposure of fauna populations is further reduced as animals do not feed exclusively at the Site. Source control alternatives SC-1, no action, and SC-2, institutional controls, would be protective of human health and the environment.

Alternative SC-3, placing a cap over the Site, would significantly reduce the leaching of residual contaminants from the unsaturated soils into groundwater via infiltration of precipitation. This Alternative would limit the future risks posed by soils to groundwater. The reduced leaching potential would translate into lower chemical loadings into groundwater, hence lower risks to potential downgradient receptors. The limited risk identified in the Risk Assessment as vegetative uptake of contaminants would be eliminated by Alternative SC-3 by removing existing vegetation and capping the major source areas.

Even though Site soils do not pose a significant risk to either human health or the environment, the FS did determine that residual VOCs will continue to impact groundwater above MCLs for a minimum of 10 years and potentially up to 20 years. Alternative SC-4 requires the installation and implementation of a soil vapor extraction (SVE) system. The SVE system would be operated until remaining levels of contaminants in the soils would no longer impact the groundwater above MCLs. Operation of the SVE system would satisfy South Carolina ambient air requirements. Therefore, this alternative would be protective of human health and the environment.

10.1.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

This criterion assesses the alternatives to determine whether they attain applicable or relevant and appropriate requirements (ARARs) under federal environmental laws and state environmental or facility siting laws, or provide justification for waiving an ARAR. Section 9.3 defines the three types of ARARs: Action-Specific, Chemical-Specific, and Location-Specific. The Site specific ARARs are identified below.

10.1.2.1 Action-Specific ARARs

The off-site discharge of treated groundwater to Jones Creek via a NPDES permit must comply with the Clean Water Act (CWA), Section 402. As the discharge will be a point source, the following sections of CWA will also apply: 301, 304, 306, 307, 308, and 403. The NPDES program is implemented under 40 CFR 122-125.

The required treatment for extracted groundwater in Alternatives GWC-3 and GWC-4 is air stripping. ARARs for air stripping include: the Clean Air Act (CAA), Section 109, National Ambient Air Quality Standards (NAAQS) (40 CFR 50); Resource Conservation and Recovery Act (RCRA) (40 CFR 264.251(f), 40 CFR 264 & 265 Subparts Y, Z, AA, & BB); and South Carolina Air Pollution Control Regulations No. 62.1, Section II, F.2.g and No. 62.5, Standard No 8. Toxic Air Pollutants.

10.1.2.2 Chemical-Specific ARARs

Groundwater cleanup standards for this Site are set at the most stringent of the following ARARs or To-Be-Considered guidelines (TBCs) since the aquifer has been and is continuing to be used as a source of drinking water: the RCRA Maximum Concentration Limits (MCLs); the Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), which include RCRA MCLs; the SDWA MCL Goals (MCLGs); and federal and state Water Quality Criteria (WQC).

The second to the last column in Table 19 lists the cleanup goals for the contaminants identified as chemicals of concern in the groundwater at the Medley Farm site. The last column in this table provides the source for the specific cleanup goal. The point of compliance for obtaining these cleanup goals is the entire Site.

The cleanup goals calculated for contaminants found in the unsaturated subsurface soils, TBCs, can be found in Table 18. These levels were based on a leaching model conducted during the FS.

10.1.2.3 Location-Specific ARARs

Currently there are no location-specific ARARs applicable to the Site, including the Endangered Species Act as there are no endangered species currently within the area affected by the Site. Table 20 listed all the location-specific ARARs reviewed with respect to the Medley Farm site.

10.1.2.4 ARAR Evaluation

All of the alternatives evaluated will comply with its particular set of ARARs which are specified above. However, it is the time to achieve the groundwater cleanup standards which distinguishes one alternative from another as well as by the fact that Alternatives GWC-1, GWC-2, SC-1, and SC-2 rely on natural attenuation to meet ARARs, rather than active restoration.

As Alternative GWC-1 is a no action alternative, there are no action-specific ARARs to be considered and Alternative GWC-1 does not violate any location-specific ARARs. Alternative GWC-1 will not obtain MCLs in the groundwater in the near future as it was estimated that leaching of contaminants from the soil will continue to adversely impact groundwater above MCLs for approximately 20 years. After this time frame, an insufficient quantity of contaminants would remain in the unsaturated zone to leach into the groundwater to result in levels above MCLs.

Alternative GWC-2 extends the requirements of Alternative GWC-1. Alternative GWC-2 also requires periodical groundwater monitoring to verify that contaminant concentrations at the Medley Farm property line are below MCLs.

Under Alternative GWC-3, all identified ARARs would be satisfied: MCLs in groundwater, the effluent to Jones Creek via an NPDES permit, and air emissions from the air stripping tower.

Alternative GWC-4 would not achieve MCLs across the Site, only at the Medley Farm property line. Treated groundwater and the air emissions from the air stripper would meet ARARs as specified above for Alternative GWC-3.

The only identified ARAR for contaminants detected in Site soils is the TSCA remediation level of 10 mg/kg for PCBs in areas of unrestricted access. None of the PCB soil samples were above the 10 mg/kg level. As there are neither endangered species, nor areas of significant historical importance, Alternatives SC-1 and SC-2 would not violate any location-specific ARARs. And since Alternative SC-1 is a no action alternative, there are no action-specific ARARs for this alternative to be evaluated against.

All identified ARARs would be adhered to by Alternative SC-3. The single synthetic liner cap design would meet an equivalent standard of performance to RCRA requirements. All construction activities would take place above the 100-year flood plain. The Health and Safety Plan governing all remedial activities would protect on-site workers. The implementation of Alternative SC-3 would not pose an unacceptable risk to the community.

As with Alternative SC-3, Alternative SC-4 would adhere to ARARs. This alternative would remediate subsurface soils to below calculated remediation levels specified in Table 18. As stated earlier, operation of the SVE system would conform to South Carolina air emission requirements. Spent activated carbon from the in-line carbon adsorption system will be treated, regenerated or disposed of in an approved hazardous waste landfill. ARARs for RCRA, including land disposal restrictions (LDRs) for any spent carbon will be adhered to as part of Alternative SC-4. Potential location specific ARARs would be as described for Alternative SC-3.

10.2 PRIMARY BALANCING CRITERIA

These criteria are used to evaluate the overall effectiveness of a particular remedial alternative.

10.2.1 Long-term Effectiveness and Permanence

This criterion assesses the long-term effectiveness and permanence an alternative will afford as well as the degree of certainty to which the alternative will prove successful.

Under Alternatives GWC-1 and GWC-2, the risks posed by the residual contamination would remain unchanged. Since residual contamination would remain at the Site, review of the effectiveness of this alternative would be required every five (5) years. Conditions at the Site are not anticipated to change significantly over the first 5 year period. The additional activity to be included for Alternative GWC-2 is the periodic monitoring of the groundwater. Other than this, the activities remain the same as described for Alternative GWC-1.

Under Alternative GWC-3 and Alternative GWC-4, extraction wells would achieve removal of groundwater for subsequent treatment. Groundwater recovery via extraction wells and submersible pumps is a readily implementable technology with a certain degree of success. Air stripping is an effective and reliable process for removing VOCs from water. Maintenance consists of periodic inspection of the wells, pumps, control units, packing, blower, and transfer pumps. A 5-year review of this remedy would not be required once the remediation levels were maintained and verified for an extended period of time.

Potential migration pathways for chemicals in Site soils are surface run-off and leaching to groundwater. The RI determined that chemical migration via surface run-off was not significant; however, VOCs, the primary chemicals of concern, would leach from the unsaturated zone and impact groundwater above MCLs. Since waste residuals would be left in place under Alternatives SC-1, SC-2, and SC-3, review of the effectiveness and protectiveness of these alternatives would be required at least every five years. Conditions at the Site are not anticipated to change significantly during the first five year period.

Chemical transport following the construction of a cap under Alternative SC-3 would be significantly less than under current conditions. Remaining risks associated with chemical residuals outside of the cap would not be significant. Evaluating the effectiveness of Alternative SC-3 could be accomplished through periodic groundwater monitoring. Since landfill residuals would remain at the Site, review of the effectiveness and protectiveness of this alternative every five years would be required. Inspection and maintenance records for the cap would be reviewed at this time. Conditions at the Site are anticipated to improve with the placement of the cap.

The SVE system as called for by Alternative SC-4 would be operated until the levels specified in Table 18 were attained. Confirmation sampling may be required to verify that the remediation levels had been achieved before the SVE system was shut down. Following the completion of Alternative SC-4, subsurface soils would no longer impact groundwater above remediation levels,

therefore, no long-term management of the Site would be required following implementation of this alternative. Even though soils would no longer adversely impact groundwater, a five year review would still be required because contaminant levels in the groundwater exceed ARARs.

10.2.2 Reduction of Toxicity, Mobility or Volume

This criterion assesses the degree to which the alternative employs recycling or treatment to reduce toxicity, mobility, or volume (TMV) of the contaminants present at the Site.

Neither Alternative GWC-1 nor Alternative GWC-2 would significantly reduce the toxicity, mobility or volume of Site residuals. A slight level of remediation may occur through natural processes, but site-related chemicals would remain in both Site soils and the groundwater and have the potential to discharge to Jones Creek under this alternative. However, such discharge would not pose a significant risk.

Under Alternative GWC-3 and Alternative GWC-4, groundwater extraction would reduce the volume of chemicals at the Site while the subsequent treatment would reduce the toxicity of groundwater prior to discharge. The Feasibility Study calculated that Alternative GWC-3 would reduce the total mass of VOCs in the groundwater by more than 99 percent and Alternative GWC-4 would achieve a 95 percent reduction.

Neither Alternative SC-1 nor Alternative SC-2 would significantly reduce the TMV of remaining Site residuals. Some remediation may occur through natural processes such as biodegradation, adsorption, dilution, and volatilization.

Alternative SC-3 would greatly reduce the mobility and potential exposure of chemicals above the water table. The mobility of chemicals below the water table would not change significantly. There would be no reduction in toxicity or volume of site-related chemicals.

Alternative SC-4 will permanently reduce the volume of VOCs in soils by more than 95 percent, thereby addressing the risk soil contamination poses to groundwater. Extracted VOC levels that exceed State ambient air limits would be adsorbed onto activated carbon. The spent activated carbon could be either incinerated or regenerated, depending on a cost comparison to be completed in the Remedial Design. Some reduction of SVOCs in the soils will also be achieved through the implementation of this alternative.

10.2.3 Short-term Effectiveness

This criterion assesses the short-term impact of an alternative to human health and the environment.

Neither Alternative GWC-1 nor Alternative GWC-2 present any risks to the community, on-site workers, or the environment due to implementation. The only difference between Alternative GWC-1 and Alternative GWC-2 is that Alternative GWC-1 would probably require the installation of additional monitoring wells.

The installation of extraction wells and the emissions from the air stripper called for by Alternative GWC-3 and Alternative GWC-4 would pose no significant threat to the community or on-site workers. During the actual construction of the remedial action, the on-site workers would be protected from potential risks through adherence to the remedial Health and Safety Plan. It is estimated to take approximately three (3) months to implement either of these alternatives.

Since neither Alternative SC-1 nor SC-2 require that any type of activity be implemented, these alternatives would not present additional risks to the community, on-site workers or the environment due to implementation. These alternatives can be implemented immediately.

In order to implement Alternative SC-3, grubbing and grading of the Site would be necessary for construction of the cap. Dust control would need to be exercised to minimize the potential release of air-borne particulates. Worker safety can be controlled through adherence to the Health and Safety Plan. It is estimated this alternative would take approximately three (3) months to implement.

Alternative SC-4 presents no risks to either the community or on-site workers during installation or operation. Emissions during operation would be controlled to insure the mass of contaminants being released into the air is below allowable ambient levels. Installation of the SVE system would require approximately one month and start-up could require another month. It is anticipated that SVE would reduce the residual contamination below soil remediation levels in one year.

10.2.4 Implementability

This criterion assesses the ease or difficulty of implementing the alternative in terms of technical and administrative feasibility and the availability of services and materials.

Alternative GWC-1 is a no action alternative, and thus can be implemented immediately. Alternative GWC-2 would require a short period of time to implement as it would only require the possible installation of additional monitoring wells and the initiation of institutional controls.

No problems are anticipated in implementing either Alternative GWC-3 or Alternative GWC-4. These alternatives may require the installation of extraction wells and additional monitoring wells, if needed. Distribution lines to the groundwater treatment system would be below grade and heat traced to prevent potential freezing where placed above the frost line. Installation of an air stripper for the anticipated flow of 30 gpm under

Alternative GWC-3 or the flow of 15 gpm under Alternative GWC-4, would have no special installation requirements and the groundwater treatment system should be readily constructed.

Alternatives SC-1 and SC-2 can be implemented immediately, and neither would hinder the implementation of any remedial actions in the future. No Site maintenance would be required. As there would be no change in the TMV of the soils, the Site would need to be reviewed every five years.

The construction of the cap as required by Alternative SC-3 is a straightforward operation. Clearing the Site and establishment of access for heavy machinery should pose no difficulties.

The installation of the SVE system as called for in Alternative SC-4 presents no difficulties. The SVE vacuum and control system is designed to run unattended. The only required utilities are electrical and telecommunication services. Control of air emissions would be coordinated with SCDHEC. Disposal of entrained water does not present any significant difficulties. SVE is a demonstrated technology using standard equipment that is offered by a number of vendors.

10.2.5 Cost

This criterion assesses the cost of an alternative in terms of capital costs, annual operation and maintenance (O&M) costs, and net present value of capital and O&M costs.

Alternative GWC-1 involves no capital costs. Operating costs consist of a review of the Site conditions every 5 years. There would be no maintenance costs. A summary of the estimated costs is given below:

Total Construction Costs -	\$0
Present Worth O&M Costs -	<u>\$140,000</u>
Total Present Worth Costs -	\$140,000

Capital costs for Alternative GWC-2 include the construction of up to four additional monitor wells. Operating costs include periodic sampling of selected monitoring wells, chemical analyses of these samples, and reporting on, and reviewing the Site conditions every 5 years. Maintenance costs would include inspection of the monitor wells. A summary of the estimated costs is given below:

Total Construction Costs -	\$ 35,000
Present Worth O&M Costs -	<u>\$750,000</u>
Total Present Worth Costs -	\$785,000

As discussed in Section 9, Alternative GWC-3 originally had three different treatment options. They were:

- GWC-3A - Air Stripping,
- GWC-3B - Activated Carbon Adsorption, and
- GWC-3C - Chemical Oxidation.

Since alternatives GWC-3A, -3B, and -3C achieve equivalent treatment of the contaminated groundwater, the air stripping technology is preferred over the two other alternatives due to a cost comparison, both 3B and 3C were eliminated based on a cost comparison.

Construction costs associated with Alternative GWC-3 include mobilization; extraction wells and the groundwater distribution system; the groundwater treatment system; discharge line to Jones Creek; upgrading the Site roads; and utility connections. Operating costs include power and maintenance for the extraction wells; labor, power, and sampling for the treatment system; and groundwater monitoring. Maintenance costs include facility inspections and equipment repair.

A summary of the estimated costs is given below:

Total Construction Costs -	\$ 610,000
Present Worth O&M Costs -	<u>\$ 780,000</u>
Total Present Worth Costs -	\$1,390,000

Construction costs associated with Alternative GWC-4 include mobilization; extraction wells and the groundwater distribution system; the groundwater treatment system; discharge line to Jones Creek; upgrading the Site roads; and utility connections. Operating costs include power and maintenance for the extraction wells; labor, power, and sampling for the treatment system; and groundwater monitoring. Maintenance costs include facility inspections and equipment repair.

A summary of the estimated costs is given below:

Total Construction Costs -	\$ 520,000
Present Worth O&M Costs -	<u>\$ 770,000</u>
Total Present Worth Costs -	\$1,290,000

There are no construction costs associated with either Alternative SC-1 or SC-2. Operating costs consist of a review of the Site conditions every 5 years. There would be no maintenance costs. A summary of the estimated costs for both SC-1 and SC-2 is given below:

Total Construction Costs -	\$ 0
Present Worth O&M Costs -	<u>\$140,000</u>
Total Present Worth Costs -	\$140,000

Construction costs associated with Alternative SC-3 include mobilization, excavation, grubbing, grading, earth work, material, and labor. Operating costs include maintenance of the cap, reporting, and review of the Site every five years. Maintenance costs include periodic inspections and grounds keeping.

A summary of the estimated costs is given below:

Total Construction Costs -	\$ 580,000
Present Worth O&M Costs -	<u>\$ 420,000</u>
Total Present Worth Costs -	\$1,000,000

Construction costs associated with Alternative SC-4 include installation and materials for the SVE wells and manifold piping. Operating costs include leasing of the SVE equipment, disposal of spent carbon, and regular monitoring and maintenance.

A summary of the estimated costs is given below:

Total Construction Costs -	\$260,000
Present Worth O&M Costs -	<u>\$360,000</u>
Total Present Worth Costs -	\$620,000

10.3 MODIFYING CRITERIA

State and community acceptance are modifying criteria that shall be considered in selecting the remedial action.

10.3.1 State of South Carolina Acceptance

The State of South Carolina concurs with the selected remedy.

10.3.2 Community Acceptance

A Proposed Plan Fact Sheet was distributed to interested entities on February 8, 1991. Copies of the Proposed Plan were sent to local residents, local newspapers, local radio and TV stations, the PRP steering committee, and local, State, and Federal officials. The Proposed Plan public meeting was held on February 12, 1991.

The public comment period on the Proposed Plan was began on February 13, 1991 and was to close on March 14, 1991. However, due to a letter requesting an extension to the public comment period, the comment period did not end until April 12, 1991.

Only one set of written comments were received during the public comment period. These comments and the questions asked during the February 12 public meeting are summarized in the attached Responsiveness Summary.

11.0 DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for this Site is:

- extraction and on-site treatment by air stripping of groundwater contaminated across the entire Site;
- off-site discharge of treated groundwater to Jones Creek via an NPDES discharge permit;

- in-situ soil vapor extraction of contaminated soils (those above the calculated soil remediation levels);
- review the existing groundwater monitoring system to insure proper monitoring of groundwater; if deemed necessary, additional monitoring wells will be installed to mitigate any deficiencies in the existing groundwater monitoring system; and
- monitoring of soil, groundwater, and surface water.

This remedy will attain a 10^{-6} cancer risk level across the entire Site. To obtain this risk level, this remedial action alternative requires the extraction and treatment of groundwater above MCLs as well the removal of residual soil contamination that would continue to adversely impact groundwater above MCLs.

11.1 MONITORING EXISTING CONDITIONS

As part of the Remedial Design, the wells listed below, at a minimum, will be sampled and analyzed on a quarterly basis. Samples from the following wells will be analyzed for the same range of volatile organics as in the RI: SW-1, BW-1, BW-4, SW-101, SW-106, BW-106, SW-108, and BW-108. The following well samples will also be analyzed for the same range of semi-volatile organics as in the RI: SW-3, SW-4, BW-2, and BW-105. If the first set of analyses for semi-volatile organics verifies the findings of the RI, then the sampling and analyses for semi-volatile organics can be discontinued during the RD.

The two tributaries to Jones Creek that border the Site shall also be sampled during the RD. The sampling point in the tributary that lies to the northeast of the Site shall be in the vicinity, downgradient of monitoring well cluster SW-108/BW-108. The sampling point in the tributary that lies south of the Site shall be in the vicinity, downgradient of monitoring well cluster SW-106/BW-106. These samples, both surface water and sediment, shall be analyzed for volatile organics. This analytical data will confirm if contaminated groundwater is discharging to these tributaries. If contamination is found in either of these tributaries, then these sampling points will be added to the overall monitoring scheme for the Site to be developed in the RD.

11.2 GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE

This remedial action will consist of a groundwater extraction and treatment system, and an overall monitoring program for the Site. Groundwater contaminated above MCLs will be extracted across the entire Site. This will be accomplished by installing a series of extraction wells located within and at the periphery of the contaminant plume in the saprolite and bedrock portions of the aquifer.

The estimated total volumetric flow is 43,200 gallons per day. This is based on a 30 gpm groundwater extraction system operating 24 hours a day. More precise groundwater withdrawal and discharge values will be developed as part of the remedial design. As stated previously, the point of compliance is the entire Site.

The extraction system will be developed in the remedial design. It is anticipated that 7 extraction wells will be needed (refer to Figure 22). Pump tests and groundwater modeling may be required for the design of the extraction system.

Treatment of groundwater will be accomplished by means of an air stripping tower. From the extraction wells, groundwater will be pumped into an equalization tank before it is fed to the air stripping system. The air stripper will remove the VOCs from the groundwater. If the treated groundwater meets standards to be specified in the NPDES discharge permit, it will be discharged to Jones Creek. Due to the potential of having concentrations of metals above allowable levels in the effluent under the NPDES program, it may be necessary to reduce metal concentrations in the groundwater prior to discharge. Metal removal from the groundwater may consist of precipitation, flocculation, ion exchange, or some other cost effective method.

The following details will need to be addressed as part of the remedial design: (1) the need to remove metals from the extracted groundwater prior to discharging to Jones Creek; (2) the disposal of any waste stream associated with the removal of metals; and (3) the need for controlling the off-gas of the air stripper. The necessity for removing metals prior to discharging the treated groundwater to Jones Creek will be addressed in the preparation for obtaining the NPDES discharge permit. Data generated as part of the RD will also confirm if the off-gas from the air stripper, laden with volatiles stripped from the groundwater, will need to be controlled.

As stated previously, the goal of this remedial action is to restore groundwater to its beneficial use as a drinking water source. Based on information obtained during the RI and on a careful analysis of all remedial alternatives, EPA and the State of South Carolina believe that the selected remedy will achieve this goal. Groundwater contamination may be especially persistent in the immediate vicinity of the contaminants' source, where concentrations are relatively high. The ability to achieve cleanup goals at all points throughout the area of the plume, cannot be determined until the extraction system has been implemented, modified as necessary, and plume response monitored over time. If the implemented groundwater extraction system cannot meet the specified remediation goals, at any or all of the monitoring points during implementation, the contingency measures and goals described below may replace the selected remedy and goals for these portions of the plume. Such contingency measures will, at a minimum, prevent further migration of the plume and include a combination of containment technologies and institutional controls. These measures are considered to be protective of human health and the environment and are technically practicable under the corresponding circumstances.

The selected remedy will include groundwater extraction for an estimated period of 30 years, during which time the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

- a) alternating pumping at wells to eliminate stagnation points;
- b) pulse pumping to allow aquifer equilibration and to allow adsorbed contaminants to partition into groundwater;
- c) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume; and
- d) at individual wells where cleanup goals have been attained, and after analytical confirmation, pumping may be discontinued.

To ensure that cleanup goals will be obtained and maintained, the aquifer will be monitored at those wells where pumping has ceased initially every year following discontinuation of groundwater extraction. This monitoring will be incorporated into an overall Site monitoring program which will be fully delineated in the Operations and Maintenance portion of the Remedial Design.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use, all of the following measures involving long-term management may occur, for an indefinite period of time, as a modification of the existing system:

- a) engineering controls such as physical barriers, or long-term gradient control provided by low level pumping, as containment measures;
- b) chemical-specific ARARs will be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further containment reduction;
- c) institutional controls will be provided/maintained to restrict access to those portions of the aquifer which remain above health-based goals, since this aquifer is classified as a potential drinking water source;
- d) continued monitoring of specified wells; and
- e) periodic reevaluation of remedial technologies for groundwater restoration.

The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at intervals of at least every five years, in accordance with CERCLA 121(c). To ensure State and public involvement in this decision at this Site, any changes from the

remediation goals identified in this ROD will be formalized in either an Explanation of Significant Difference document or an Amendment to this Record of Decision thereby, providing an opportunity for State and public participation.

11.3 SOURCE REMEDIATION

Although the Baseline Risk Assessment indicates that residual soil contamination under present day conditions does not pose an unacceptable risk to either human health or the environment, the soils will continue to adversely impact the quality of groundwater above MCLs at the Site. This leaching of contaminants from the unsaturated soils into groundwater results in an unacceptable indirect risk under the future risk scenario, consequently, SVE is warranted to remove contaminants from the soil.

A SVE system is an in-situ treatment process used to clean up soils that contain VOCs and SVOCs by inducing a vacuum in the subsurface soils. The SVE system consists of a network of air withdrawal (or vacuum) wells installed in the unsaturated zone. A pump and manifold system of PVC pipes is used for applying a vacuum on the air withdrawal wells which feed into an in-line water removal system and an in-line vapor phase carbon adsorption system for VOC and SVOC removal. The subsurface vacuum propagates laterally, causing in-situ volatilization of compounds that are adsorbed to soils. Vaporized compounds and subsurface air migrate to the air extraction wells, essentially air stripping the soils in-place.

At the Medley Farm site, the vacuum wells can be installed vertically to the full depth of the contaminated unsaturated zone (approximately 60 feet below surface level). Vertical wells were selected due to the depth of the soil strata requiring remediation, geotechnical conditions, and the depth to groundwater.

Once the well system is installed and the vacuum becomes fully established in the soil column, VOCs and some SVOCs are drawn out of the soil and through the vacuum wells. In all SVE operations, the daily removal rates decrease as contaminants are recovered from the soil. This treatment technology has been proven effective at treating soils that contain elevated levels of organic contaminants.

The application of SVE to the unsaturated zone remediation is a multi-step process. Specifically, full-scale vacuum extraction systems are designed with the aid of laboratory and pilot-scale VOC stripping tests. Further testing will be performed as part of the remedial design.

The final disposition of the spent activated carbon from the in-line carbon adsorption system will be specified in the remedial design. The three options to be considered are treatment, disposal at an approved hazardous waste landfill or regeneration of the carbon. Compliance with ARARs for RCRA, including LDRs for treatment, storage, and/or disposal of spent carbon will be assured as part of the RD.

11.4 COST

The total present worth cost for the selected alternative is \$2,404,000. The break down of this cost is specified below.

The present worth cost for the groundwater extraction and air stripping alternative is approximately \$1,855,000. This cost includes a capital cost of \$609,000 for construction of the groundwater extraction system, the treatment unit, treated groundwater discharge system, and all associated piping. This cost also includes annual expenditures for operation and maintenance of the system of \$1,246,000 for 30 years.

The present worth cost for the SVE system with vapor phase carbon adsorption is approximately \$549,000. This cost includes a capital cost of \$344,000 for construction of the SVE system, the vapor phase carbon adsorption system, and all associated piping. This cost also includes annual expenditures for operation and maintenance of the system of \$205,000 for 2 years.

Capital Cost for Groundwater Extraction and Treatment System	\$ 609,000.00
Operation & Maintenance Costs for 30 years	\$1,246,000.00
Capital Cost for the Soil Vapor Extraction System	\$ 334,000.00
Operation & Maintenance Costs for 2 years	\$ 205,000.00
<hr/>	
TOTAL PRESENT WORTH COST	\$2,384,000.00

12.0 STATUTORY DETERMINATION

The selected remedy satisfies the requirements of Section 121 of CERCLA.

12.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy will permanently treat the groundwater and soil and removes or minimizes the potential risk associated with the wastes. Dermal, ingestion, and inhalation contact with Site contaminants would be eliminated, and risks posed by continued groundwater contamination would be reduced.

12.2 COMPLIANCE WITH ARARs

This alternative will be designed to meet all ARARs of Federal and more stringent State environmental laws. A complete discussion of the ARARs which are to be attained is included in Sections 9.3 and 10.1.2. These sections also describe the TBC requirements.

12.3 COST-EFFECTIVENESS

The selected groundwater and source remediation technologies are more cost-effective than the other acceptable alternatives considered primarily because they provide greater benefit for the cost.

12.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT
TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT
PRACTICABLE

The selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this action. Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility or volume achieved through treatment; short-term effectiveness, implementability, and cost; State and community acceptance; and the statutory preference for treatment as a principal element.

12.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The preference for treatment is satisfied by the use of a vacuum extraction system to remove contamination from soil at the Site and the use of air stripping to treat contaminated groundwater at the Site. The principal threats at the Site will be mitigated by use of these treatment technologies.

**RESPONSIVENESS SUMMARY
FOR THE
PROPOSED REMEDIAL ACTION PLAN
AT THE
MEDLEY FARM SUPERFUND SITE
GAFFNEY, SOUTH CAROLINA**

Public Comment:
February 13 through April 14, 1991

May 1991

Prepared for:
U.S. Environmental Protection Agency
Region IV

MEDLEY FARM SUPERFUND SITE
RESPONSIVENESS SUMMARY
FOR THE
PROPOSED REMEDIAL ACTION PLAN

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ATTACHMENTS

- Attachment A - Transcript of Public Meeting
- Attachment B - Materials Distributed at Public Meeting
- Attachment C - List of Local Community Members at Public Meeting
- Attachment D - Copy of Public Notices
 - 1. Public Meeting
 - 2. Extension of Public Comment Period
- Attachment E - Letter from Medley Farm Site Steering Committee to EPA, dated April 12, 1991
- Attachment F - Letter from EPA to Steering Committee, dated May 6, 1991

RESPONSIVENESS SUMMARY
for the U.S. EPA Region IV
Medley Farm Superfund Site Public Meeting
Gaffney High School, Gaffney, South Carolina
February 12, 1991

This community relations Responsiveness Summary is divided into the following sections:

Overview: This section discusses EPA's preferred alternatives for remedial action.

Background: This section provides a brief history of community interest and concerns raised during remedial planning at the Medley Farm Superfund Site.

Part I: This section provides a summary of major issues and concerns received in the comments, and expressly acknowledges and responds to those raised by the local community. "Local community" may include local homeowners, businesses, the municipality, and not infrequently, potentially responsible parties (PRPs).

Part II: This section provides a comprehensive response to all significant comments and is comprised primarily of the specific legal and technical questions raised during the public comment period. If necessary, this section will provide technical details on answers presented in Part I.

OVERVIEW

EPA published its preferred remedial alternative for the Medley Farm Superfund Site, located in Gaffney, South Carolina in the Proposed Plan Fact Sheet, mailed to the public on February 8, 1991, and in the public notice published in the Greenville News on February 10, 1991 (refer to Attachment D). The February 12 public meeting initiated the public comment period. EPA's preferred alternative addresses contamination of the groundwater and surface soils around the Site. The preferred remedy includes the following technologies as described in the Feasibility Study completed in April 1991:

- Treatment Using Air Stripping: Recovery of groundwater above maximum contaminant levels (MCLs) and treating the extracted groundwater through an air stripping tower prior to discharging to Jones Creek via a National Pollutant Discharge Elimination System (NPDES) permit. If necessary to comply with applicable portions of the Clean Air Act and the South Carolina Pollution Control Act, the off-gas will be controlled using an activated carbon unit.

- Soil Vapor Extraction: Employ soil vapor extraction in areas exceeding calculated soil remediation levels. If necessary to comply with applicable portions of the Clean Air Act and the South Carolina Pollution Control Act, the extracted vapors will be controlled using an activated carbon unit.

EPA's preferred alternative for addressing groundwater contamination involves extracting or removing contaminated water from the upper and bedrock portions of the aquifer using extraction wells and treating the contaminated water by air stripping. Air stripping is a process in which air is forced through contaminated water, causing volatile organic compounds (VOCs) to evaporate. Once this process is completed, extracted groundwater will be discharged to Jones Creek via an NPDES permit.

EPA's preferred alternative for addressing contaminated soils is soil vapor extraction (SVE). As proposed, the SVE treatment process will remove VOCs and some semi-volatile organic compounds (SVOCs) from the soil. A vacuum extraction system consists of a network of air withdrawal (or vacuum) wells installed in the unsaturated zone. A pump and manifold system of pipes is used to apply a vacuum on the air wells that feed an in-line water removal system, and an in-line vapor phase carbon adsorption system for VOC and SVOC removal. Vacuum wells can either be installed vertically to the full depth of the contaminated unsaturated zone or installed horizontally within the contaminated unsaturated zone. Vertical wells were selected at this Site due to the depth of the soil strata requiring remediation, geotechnical conditions, and the depth to groundwater.

Although the Risk Assessment indicates that the soil, under present conditions, does not pose an unacceptable risk to human health or the environment, the remediation of soils is required as the soils will continue to adversely impact the groundwater flowing beneath the Site above acceptable levels. Therefore, the Agency has determined that SVE is warranted to remove contaminants from the soil.

BACKGROUND

Community interest and concern about the Medley Farm site has been moderate over the past several years. EPA has sponsored a number of public meetings and released six fact sheets to help the community understand its role in the Superfund process and to share information regarding the direction and technical objectives of data collection activities at the Site. A broad cross-section of the community has been represented at these meetings, including local government officials, community residents, and the PRPs.

To obtain public input on the Agency's proposed plan for remedial action at the Medley Farm site, EPA held a public comment period from February 13, through April 14, 1991. The public comment period, originally scheduled to end March 14, 1991, was extended 30 days at the request of the community, to allow additional time to comment on the proposed plan.

The letter to EPA documenting these comments on the selection of a remedy, dated April 12, 1991, is attached as Attachment E to this summary.

Response:

It is the Agency's opinion that the selected remedy is the best overall choice for remediation of both soil and groundwater at the Site. The natural flushing alternative is not acceptable because:

- The time necessary to pump and treat the groundwater after the natural flushing period is underestimated;
- Cost savings from the commenting entity's proposal may not be substantial and do not justify reliance on natural flushing; and
- Technical publications strongly recommend addressing residual source areas using a companion technology with pump-and-treat, such as SVE.

EPA believes that eliminating the residual source areas by using SVE is more logical than using natural flushing, since the areas are a potential problem which would likely affect the pump-and-treat system.

In reviewing the feasibility of a remedy, EPA is required by legislation to consider two criteria not addressed in the entity's comments: State and community acceptance of the remedy. State and community representatives will not support a natural flushing, or "No Action", scenario. In fact, the South Carolina Department of Health and Environmental Control (SCDHEC) has concurred with and supports the selected remedy. It is therefore the Agency's opinion that the selected remedy is the best overall choice for remediation of both soil and groundwater at the Medley Farm Site.

PART II: COMPREHENSIVE RESPONSE TO SIGNIFICANT COMMENTS

This section provides a comprehensive response to all significant comments on the Medley Farm Superfund Site received during the public comment period. The information presented in this section provides technical details for issues discussed in Part I, specifically, issues raised regarding the selection of a remedy for the Medley Farm Superfund Site. Technical issues are discussed in terms of the following:

- Duration of the Response Action,
- Cost Estimates, and
- Companion Treatment System.

This discussion is presented in the section below.

Duration of the Response Action

The Agency does not dispute the findings of the studies researched by the entity commenting that the time required to pump and treat groundwater with residual soil contaminants removed during the first year is underestimated. The underestimation of time, however, also applies to pump and treat groundwater 20 years in the future to remove the residual contaminants entering the groundwater (natural flushing), not just SVE.

The assumption that a 50% reduction in the concentrations of residual contaminants present in the groundwater will be needed may not hold true, since there are uncertainties associated with the assumptions required by the computer models. Treating contaminants that enter the groundwater in the 20th year of natural flushing by the groundwater pump-and-treat system could take an additional 10 years to be removed from the aquifer. The difference in time frames between the natural flushing alternative and the SVE alternative will be therefore greater than 11 years. In addition, further pump-and-treat time may be necessary to remove the last contaminants entering groundwater, and contaminants may continue to enter the groundwater beyond 20 years. This would delay further the attainment of cleanup goals.

Cost Estimates

The entity commenting claims that the cost estimates are inaccurate because they are based on estimates of the duration of the remedial action. If only five years were required to bring residual concentrations down to MCLs, the additional costs for groundwater remediation at present worth costs would be \$539,000; if eight years were required they would be \$601,000; and if ten years were required they would be \$638,000. Since the present worth cost for SVE is \$620,000, the estimated savings generated by natural flushing are thus not greater than \$200,000, but rather more likely range between \$0 and \$81,000. These savings are not substantial when measured against the estimated total cost (net present worth) of the remedy, or \$1.2 million for 10 years and \$1.8 million for 30 years, and are not enough to justify selecting natural flushing as a source control remedy.

Companion Treatment System

EPA technical publications (refer to EPA letter, included as Attachment F, for relevant publications) recommend that any and all residual source areas be removed or addressed by a companion treatment system to enhance and improve the effectiveness of pump-and-treat systems. These publications support the Agency's opinion that preventing or minimizing the contaminant mass from moving from the unsaturated zone to the saturated zone makes more economic and environmental sense than waiting for the contamination to enter groundwater and then attempting to remediate the contamination.

ATTACHMENT A - MEETING TRANSCRIPT

1 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

2
3
4 MEDLEY FARM SUPERFUND SITE
5 PROPOSED PLAN PUBLIC MEETING
6
7

8 TUESDAY, FEBRUARY 12, 1991

9 7:00 O'CLOCK P.M.
10
11

12 GAFFNEY HIGH SCHOOL
13 GAFFNEY, SOUTH CAROLINA
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(803) 556-2923 OR TOLL FREE IN U.S.A. 1-800-822-8711

1 MR. JON BORNHOLM: Good evening. It's a
2 few minutes after 7:00 o'clock. I'd like to welcome you this
3 evening. I'm John Bornholm. I'm with the Environmental
4 Protection Agency and I'll be conducting this meeting this
5 evening.

6 There are a few
7 people that I'd like to introduce. Mr. Ralph Howard with the
8 Environmental Protection Agency and Mr. Glenn Adams, also
9 with the Agency, is present tonight. Ms. Cynthia Peurifoy,
10 and I've probably done a bad job of pronouncing her name, is
11 the Community Relations Coordinator for the Environmental
12 Protection Agency.

13 I'd like to explain
14 the graphs that I will be presenting on the screen tonight.
15 This is the Medley Farm Site, the location of the site. This
16 is the Town of Gaffney. It's about six miles down the road.
17 Most of these that I'm going to be showing you have been
18 taken out of the draft remedial investigation or the draft
19 report that has been prepared for the responsible parties by
20 Sirrine Environmental Consultants.

21 We're going to go
22 through the superfund project itself. Site discovery, PRP
23 search and the ranking of the site, the responsible,
24 potentially responsible parties, the latter part of '87, the
25 potentially responsible parties signed what we call an

[
1 Administrative Order on Consent, which we viewed with the
2 feasibility study in January of '88 and this will be based on
3 our input from the public on this meeting, and the remedial
4 investigation, to develop what we call a regular decision or
5 a ROD. We expect right now to have that regular decision
6 signed by our administrator at the end of March. Following
7 that we enter into negotiations with the potentially
8 responsible parties again, to try to convince them of the
9 remedial design. Following that decision we enter into the
10 actual environmental cleanup.

11
12 Something I forgot to
13 mention. There are some handouts on the front table that
14 basically have all the overheads that I will be using. I'm
15 sorry I forgot to mention that beforehand.

16 This is what we call
17 a time line that identifies the activities that occur. What
18 I've highlighted in red is this meeting tonight, which is
19 what we call the public meeting. Tonight is our public
20 comment period, which is where we encourage the public to
21 voice their opinion with regard to the Medley Farm site. The
22 public period ends March 15th. If an additional thirty days
23 is requested by the public, we would extend it another thirty
24 days. That would extend it to April 15th. Again, this is
25 being made a part of the record this evening. Our
responsiveness summary, a transcript from tonight's meeting

and all public comments and our responses to those public comments. That's part of our record. It becomes part of this public meeting. Then it goes in the decision stage, signed by our regional administrator and it goes into the remedial design negotiations, which is approximately a six month time frame. There is negotiation with the potentially responsible parties and then if that fails there is a filing with the Federal Court, and then following that we go into the Court. That gives you an idea of our time frames.

The next is the remedial objectives of the investigation; that is to identify the contamination in both the soil and the groundwater. This will give you an idea of the characteristics of the environmental mediums at the site, the soils, the bedrock, to determine chemical, physical and hydrogeological characteristics; to determine the presence or absence of source areas. Again, we looked at the impact it would have on Jones Creek and to identify any of those potential contaminants to the public.

To accomplish that the EPA proposed to take soil borings. The results of that were published in April, I believe, of '90.

And these little circles are the locations of surface water and the soil boring locations.

1 This is just a review
2 of what they found at the site from the remedial investiga-
3 tion. The soils of the disposal areas are contaminated with
4 volatile compounds at the site, as well as semi-volatile
5 compounds. Groundwater at the site and downgradient are con-
6 taminated with volatile compounds again. Metal was detected
7 in groundwater, but that is natural occurring. The levels
8 detected did not pose a risk. The groundwater is moving in a
9 southeasterly direction and the sprouse well is hydraulically
10 upgradient of the site. There were no contaminants found in
11 Jones Creek. And Jones Creek is running through here.

12 And this overhead
13 shows the contaminants found in the bedrock portion of the
14 aquifer. Disposal activities occurred up in this area.

15 And this overhead
16 shows the direction of flow of water in the bedrock portion
17 of the aquifer and the contaminants in the southeastern
18 direction towards Jones Creek.

19 Basically this shows
20 the contaminants found in the soils at the site. Again,
21 that's volatile as well as semi-volatile organic compounds at
22 the site.

23 This gives you the
24 chemicals detected. The volatile organic compounds, 1,1,2-
25 Trichloroethane; out of thirteen it was detected in two of

those detections. The second column, that gives you the range of detected concentrations found.

This schedule shows the chemicals found in saprolite wells and this schedule identifies the chemicals found in the bedrock wells, including the number of detections and the frequency of detections.

Part of the remedial investigation is called a risk assessment objectives. Basically this looks at the contaminants detected, where they were detected and what possible pathway those contaminants have to reach either the environment or the public. And we have quantitative as well as a qualitative.

Based on the information provided during the remedial investigation, the risk document, under today's conditions, the site does not pose a risk to either public health or the environment. The feasibility study states that the site does not pose a risk in the future; that PRPs or potentially responsible parties need to go back and re-evaluate that if we feel that the groundwater, under a scenario of the site becoming a residential area, is considered.

The objectives of the feasibility study is to look at potential technology to clean up the site, and then narrowing down from that laundry list

1 the technology that are applicable to the site. There are
2 several screening factors for criteria used on the
3 technology. And then once you've cleared that, you go down
4 to a smaller list, and then we go into a more detailed
5 evaluation of those alternatives, which uses nine criteria to
6 evaluate alternatives. They basically are threshold criteria
7 ...let me back up. There are three levels of criteria. The
8 first one is threshold criteria. These must be met by the
9 alternatives. The first one being the overall attention to
10 human health and the environment and the second one is in
11 compliance with applicable or relevant and appropriate
12 requirements, which we call ARARs. That's actually...
13 A-R-A-R-S. We take these criteria and we look at them under
14 what we call primary balancing criteria and those are long
15 term effectiveness and permanence; reduction of toxicity,
16 mobility or volume; implementability; short term effective-
17 ness and then cost.

18 I'd like to briefly
19 go through that whole process. Potential groundwater
20 remediation technology at the site, considering the no action
21 alternative at all sites based on the risk assessments, which
22 is a Baseline Risk Assessment. Groundwater recovery. We had
23 certain types of ways we could recover groundwater;
24 extraction wells, subsurface trenches and drains and
25 alternative concentration limits. We have identified several

[]

1 ways of treating that groundwater once it is extracted from
2 the ground. One is air stripping, activated carbon, chemical
3 oxidation, land treatment and biological treatment. And once
4 we have it out of the ground we need to do something with it
5 after it is treated. Discharge of extracted groundwater.
6 There is the surface water discharge; pump it through the
7 local sewer plant; discharge it out through an irrigation
8 process or into injection wells on the site. And potential
9 soil remediation technologies; again the no action alterna-
10 tive. In-situ treatment, treatment in place; soil vapor
11 extraction, enhanced biodegradation, soil flushing and
12 vitrification. And also the off-site treatment or disposal;
13 incineration or disposal at an approved hazardous waste site.
14 And then containment, which is capping, slurry walls around
15 the containment, grouting, sheet piling around it or bottom
16 sealing.

17 The groundwater
18 control technology summary, the ones highlighted in red, as
19 to what was actually kept as far as potential alternatives to
20 clean up the site. And then a rough cost estimate was
21 performed for each of those alternatives and based on those
22 cost amounts, several alternatives were eliminated. What
23 these alternatives consist of, again, no action at the site,
24 let nature take its course. The second one is no action;
25 long term monitoring, which consists of, again, letting

1 nature take its course, but we would require occasional
2 sampling of the monitoring wells to address or to measure how
3 quickly mother nature is cleaning up the site as well as to
4 make sure we didn't miss anything or take care of something
5 that might come up down the road. The next is what we call
6 MCLs, which are maximum concentration levels or limits, and
7 those are levels of contaminants allowable in drinking water.
8 Under this scenario the pump and treat system would have to
9 attain that level or be above that level across the entire
10 site and it was estimated that this scenario would include or
11 would exceed up to pumping thirty gallons of groundwater per
12 minute. And then for treatment of that extracted
13 groundwater, air stripping prior to discharge to Jones Creek.
14 The fourth alternative for groundwater that was considered
15 was the MCLs at the property line of the site and then
16 treating that extracted groundwater with air stripping prior
17 to discharging the groundwater to...or the treated ground-
18 water to Jones Creek. This was estimated to be fifty gallons
19 per minute. For source control, there was a no action
20 alternative. On the second scenario for soils, there is
21 capping the source area. That would prevent rain from
22 infiltrating the soils and therefore washing the contaminants
23 further down in the groundwater. And the third alternative
24 is soil vapor extraction. That would be installing wells
25 into the saturated soils on the site, putting a vacuum on

those wells and drawing the organics out, which puts air in and allows those to be drawn up and out.

Based on the information provided in the feasibility study, basically the remedy that the EPA has selected as the preferred alternative is right here for groundwater. I think on the page that...I think this page is not in the packet. It's a loose page, unfortunately, that did not get attached; so if you'll pick one up on the way out, that would be appreciated. Basically during the remediation of the site, wells need to be sampled on a periodic basis to insure that, one, we have captured the groundwater and, two, to measure the possible remediation; Installation of a groundwater extraction system, in this case we're proposing wells, extraction wells; treating the extracted groundwater through an air tower to remove the volatile organics and then discharging that treated groundwater to Jones Creek via an NPDES Discharge Permit. NPDES stands for National Discharge...National Pollutants Discharge Elimination System. That's what NPDES stands for. I have a note here. Metal is more...the standard for discharging surface water is more stringent for metal than for organics and the levels of metal that may be in the groundwater, that are in groundwater, may cause a problem in surface waters to aquatic life; so treatment for metal may be necessary in order to meet that discharge permit requirement. And that's

[]
1 why I have that little thing in parenthesis there. And then
2 there is essentially a catch all to re-evaluate the
3 monitoring system that exists on site today to make sure that
4 we're not missing anything. And then there is the deed
5 restrictions, which would prevent somebody from installing a
6 drinking well on the site.

7 And for source
8 remediation, to install a network of air withdrawal or vacuum
9 wells in those areas that were identified as containing
10 levels of contaminants high enough to impact groundwater. As
11 I explained before, you put a vacuum on those wells to create
12 a air flow through the system to remove the organics up and
13 through the wells, and then prior to discharge, or the
14 initial start-up of the system, it will probably be
15 generating quantities of organics out of the soil, and the
16 extracted air will be sent through an activated carbon filter
17 process prior to being discharged into the environment.

18 And then we will
19 sample surface water and sediment in Jones Creek as well as
20 the tributaries to Jones Creek to make sure the system is
21 working; so if we're missing something with our groundwater
22 tracking system, we would anticipate seeing it entering this
23 surface water.

24 Basically the two
25 groundwater extraction systems considered in the feasibility

study were, one, putting a line of groundwater extraction along these two lines. This line would result in containing the NCLs across the site, which would, as I mentioned earlier, result in a thirty gallon per minute flow for groundwater. The second alternative considered in the feasibility study was this second line, the other line of extraction. This system would meet NCLs at the property boundary and result in a flow out of the ground of fifty gallons per minute. This little red box is a location of where the groundwater treatment system would be installed and would discharge, with piping, down to Jones Creek, which would be down here somewhere. It would be off the map.

This map shows those areas in the soils where concentrations of organics in soils will continue in groundwater above the maximum concentration level, and these are the areas where the soil vapor extraction system would be employed.

And this is just a schematic of the soil vapor extraction system. You have your extraction wells, your vapor extraction wells all tied into a central central manifold, which is attached to some type of suction, via a pump or blower, which is then tied into the treatment system, because you're also going to be extracting water vapor as well, which will be collected and pumped off and then the air stream will be piped through an activated

1 carbon filter to remove the volatile organics and semi-
2 volatile organics from that air stream prior to releasing
3 that air stream through the environment.

4 And I think some of
5 the names got misspelled on it. If further information is
6 requested or desired, I am the primary contact for the
7 Agency. Richard Haynes is the primary contact for the State,
8 South Carolina Department of Health and Environmental
9 Control.

10 One other thing I
11 need to mention, the Agency also has what we call a Technical
12 Assistance Branch Program, which basically gives money, under
13 certain conditions, that has to be met, to the public in
14 order for the public to hire its own consultant to basically
15 review the findings, all the documents in the superfund site,
16 and then provide that information to the public in maybe a
17 more understandable meaning. But that grant is available.
18 It's made available for all superfund sites, and the contact
19 for a technical assistance grant is Denise Bland, and that's
20 her address and telephone number.

21 Basically that's
22 really my presentation. Again, this meeting is being
23 reported by a court reporter. We need to get an accurate
24 transcript. I am opening the floor for any questions.
25 Should you have a question, please state your name so that

1 the court reporter can get an accurate account of it, and
2 please speak up loud enough so that she can hear your
3 question so that she can put that down on paper as well. Are
4 there any questions?

5 MR. CODY SOSSAMON: Cody Sossamon. What
6 companies or individuals have been named, individual
7 companies or parties, and will there be any criminal charges
8 filed against them in this?

9 MR. JON BORNHOLM: Okay, the responsible
10 parties I have at this time, the Administrative Order, are
11 Milliken and Company, Unisphere Chemical Corporation,
12 National Starch and Chemical Corporation, Abco, BASF Corpora-
13 tion, Polymer Industries, Tanner Chemical Company, Ethox
14 Chemical, Inc., and there are several others that were not
15 identified prior to the remedial action.

16 MR. CODY SOSSAMON: Are any of the
17 Medleys identified?

18 MR. JON BORNHOLM: The Medleys are also
19 identified as potential possible parties.

20 MR. CODY SOSSAMON: And Ralph Medley?

21 MR. JON BORNHOLM: Ralph and Clyde are
22 both identified as a potential possible party, too.

23 MR. CODY SOSSAMON: Do ya'll plan to
24 bring criminal charges?

25 MR. JON BORNHOLM: To the best of my

1 knowledge I do not know. I cannot say.

2 MR. CODY SOSSAMON: Are ya'll going to
3 try to recover the initial clean-up cost in this?

4 MR. JON BORNHOLM: My understanding is
5 that the majority of our clean-up costs is coming from the
6 responsible parties.

7 MR. CODY SOSSAMON: From those that you
8 named?

9 MR. JON BORNHOLM: From the ones that I
10 listed off, yes. How much each contributed, I do not know.

11 MR. CODY SOSSAMON: You don't know the
12 exact amounts?

13 MR. JON BORNHOLM: I don't remember all
14 of them, but I know that the majority of our costs have been
15 recovered.

16 MR. CODY SOSSAMON: What have they paid
17 for?

18 MR. JON BORNHOLM: The potentially
19 responsible parties have paid for all the investigation work
20 done to date. The only costs that the government has
21 incurred right now are oversight costs and we will also be
22 seeking to recover those costs from the responsible parties
23 as well. Are there any other questions?

24 MR. MATT STAHL: Matt Stahl with the
25 Spartanburg Herald Journal. How much is the cost of the

1 clean-up? I know we've seen some figures, but just how much
2 is the cost?

3 MR. JON BORNHOLM: The costs generated
4 from the feasibility study, several scenarios were put out.
5 The first, a ten year scenario for this pumping and treating
6 of groundwater was calculated, and just to round off numbers,
7 that was estimated to 1.2 million dollars. And that's on the
8 construction of groundwater remediation by itself. The same
9 thing, groundwater remediation by itself, over a thirty year
10 period, again for construction for that system, it's
11 estimated to be 1.9 million dollars. For the source remedia-
12 tion, soil vapor extraction process, the present costs were
13 set at \$550,000.00 and it was estimated to take one year to
14 do contamination soil samples; so basically if you put those
15 numbers together, the present costs for ten years of pump and
16 treat with soil vapor extraction, it's 1.8 million dollars.
17 For groundwater extraction and treatment over a thirty year
18 period, along with soil vapor extraction, it was estimated to
19 be 2.4 million dollars.

20 MR. CODY SOSSAMON: The ten years and the
21 thirty years, I'm not quite clear on what the...

22 MR. JON BORNHOLM: The significance of
23 that?

24 MR. CODY SOSSAMON: Yes.

25 MR. JON BORNHOLM: The remediation of

1 groundwater is not a science; so basically what this is doing
2 is to look at the process over a thirty year period and try
3 to generate some costs that would take care of the remedia-
4 tion period. The idea here, at least for Medley Farms, is
5 that it's been estimated by Sirrine that it will take twenty
6 years, under natural conditions, for the natural flushing of
7 soils by rain to clean the soils down to the level where
8 there is no longer any natural groundwater. That's twenty
9 years. And at the same time they're going to be treating and
10 pumping over that twenty years to remove those contaminants
11 that will be entering the groundwater. The purpose of the
12 soil vapor extraction system is to try to shorten that period
13 of allowing organics to enter the groundwater, and hopefully
14 they can shorten that period. Did that answer your question?

15 MR. CODY SOSSAMON: Yes, I think so.

16 MR. JON BORNHOLM: That's how long it
17 takes to accomplish that.

18 MR. CODY SOSSAMON: So the least it would
19 cost then is 1.8 million for ten years and 2.4 million for
20 thirty years?

21 MR. JON BORNHOLM: Correct.

22 MR. CODY SOSSAMON: If it takes thirty
23 years it would go a little bit more?

24 MR. JON BORNHOLM: Correct. And if it
25 would only take twenty years, it would take somewhere in

1 between there.

2 MR. MATT STAHL: Will the EPA have to
3 enter into negotiations with the responsible parties?

4 MR. JON BORNHOLM: Following...after the
5 Agency publishes its decision, the Agency then issues special
6 notice letters to all of the identified potentially
7 responsible parties to begin negotiations on the remedial
8 design and the investigation, and that is a six month time
9 frame that needs to be allowed. The document that hopefully
10 comes out of that process is what we call a Consent Degree,
11 and that is lodged in the Federal Court system. It's not
12 really the EPA, but we ask the Federal Court to stand behind
13 it as well. Now, if we can't come to a conclusion following
14 the six months, we will, more likely than not, issue what we
15 call a Unilateral Administrative Order forcing the PRPs to
16 implement a new design, a new remedial action, and then if
17 they refuse to do that then the superfund comes in and they
18 are then liable for further damages, if they do not go ahead
19 and do them themselves.

20 Are there any other
21 questions?

22 Okay, if you have not
23 signed on the attendance sheet, please do so on your way out
24 so that we can have an accurate record. There are fact
25 sheets that they sent out Friday. Hopefully you've received

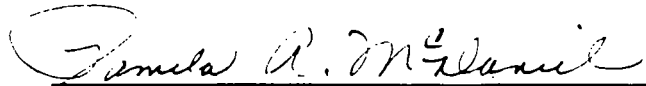
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1 them by now. If you haven't received one, please take one on
2 the way out. And again, there's a copy of a lot of the
3 overheads that I used tonight. Please feel free to take one
4 so that I don't have have to carry them back to Atlanta with
5 me. And with that, thank you.

6 *****

C-E-R-T-I-F-I-C-A-T-E:

I, Pamela A. McDaniel, Notary Public and Court Reporter, certify that the foregoing pages constitute a true and accurate transcript, to the best of my ability, of the proceedings as taken by me stenographically on the date and at the time hereinbefore mentioned.



NOTARY PUBLIC FOR SOUTH CAROLINA

My Commission Expires: 12/18/95

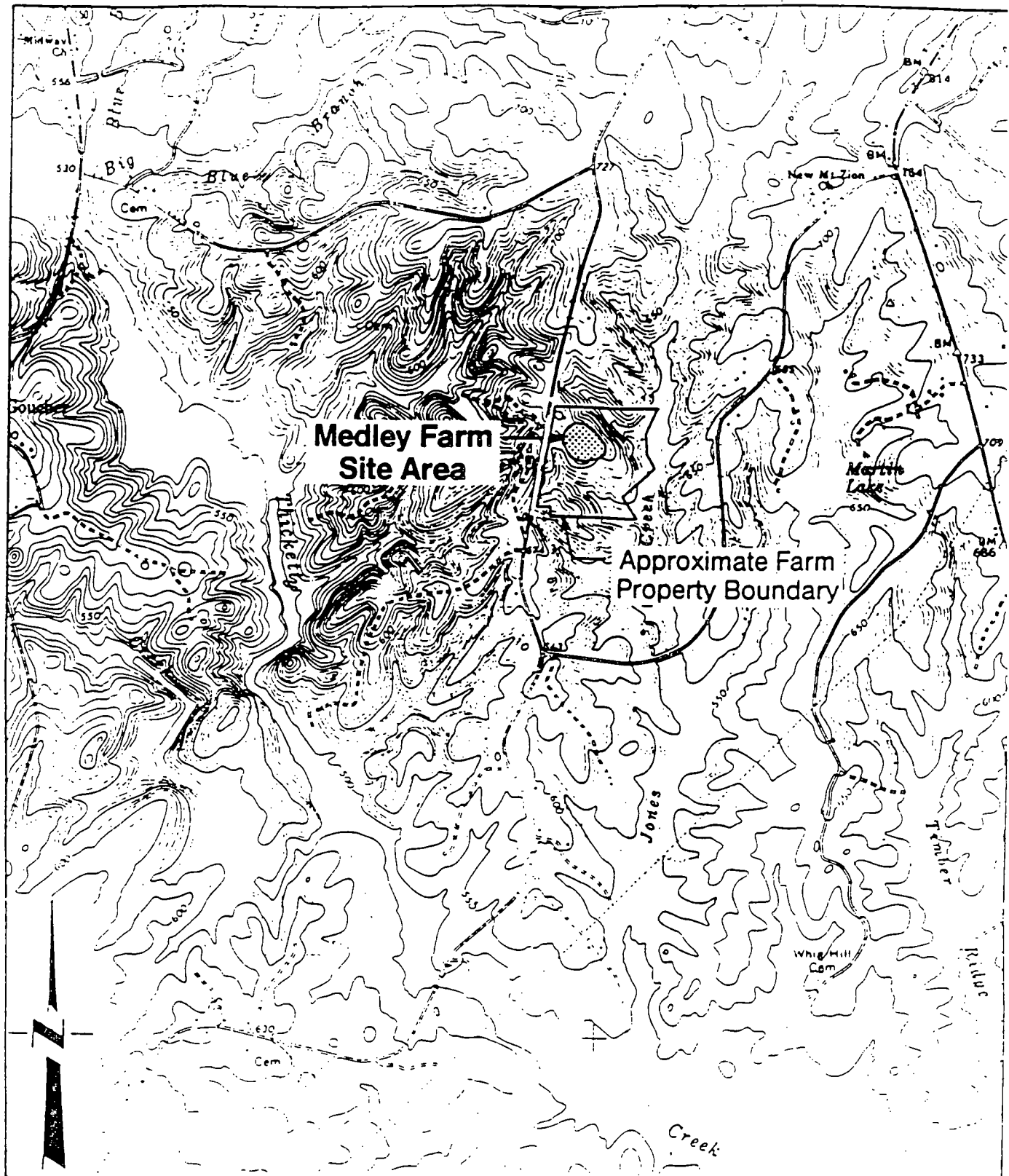
ATTACHMENT B - HANDOUT MATERIALS

**WELCOME TO THE
MEDLEY FARM SUPERFUND SITE
PROPOSED PLAN PUBLIC MEETING**



TUESDAY, FEBRUARY 12, 1991

7:00 PM



USGS Pacolet Mills Quadrangle

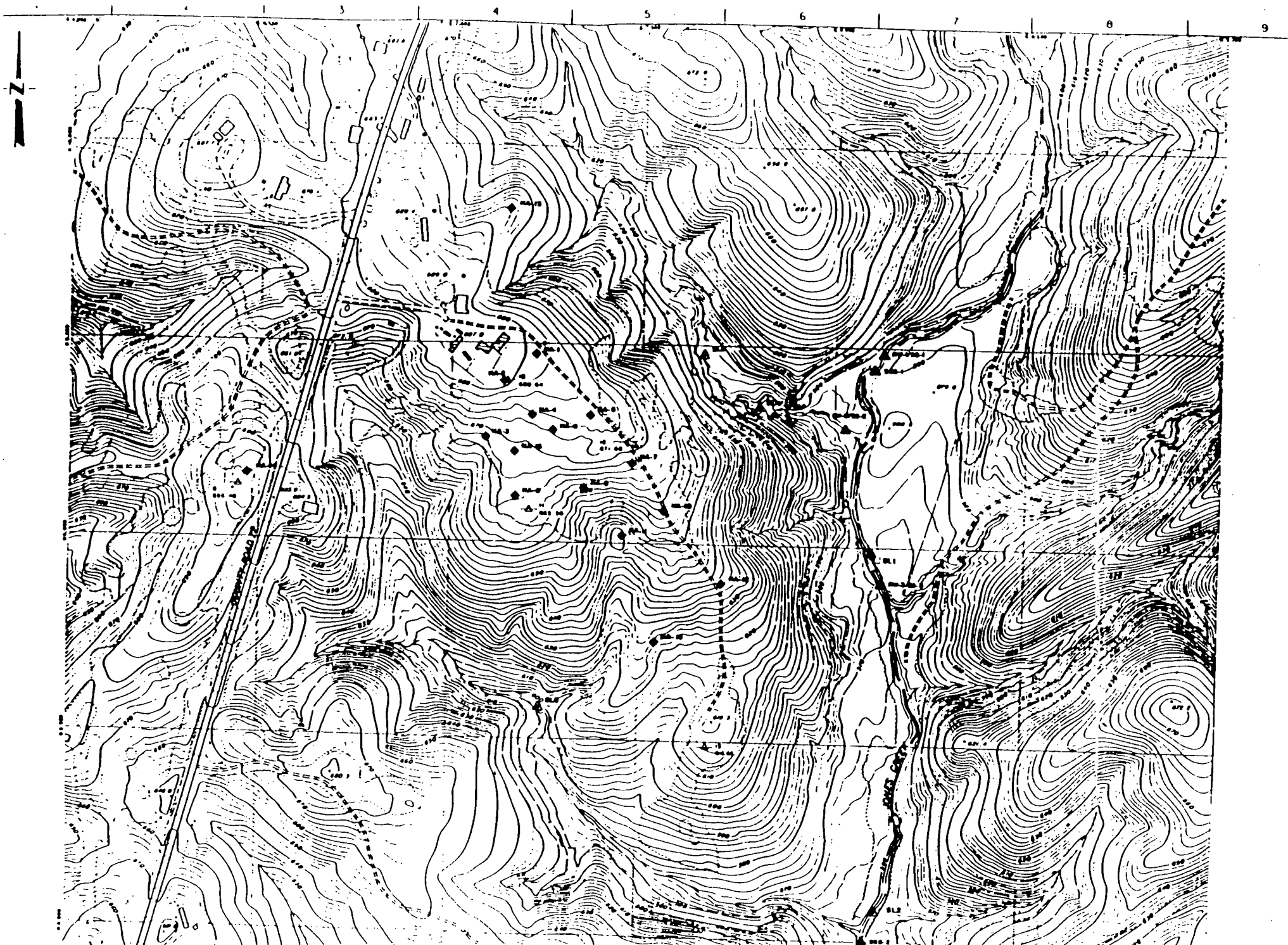
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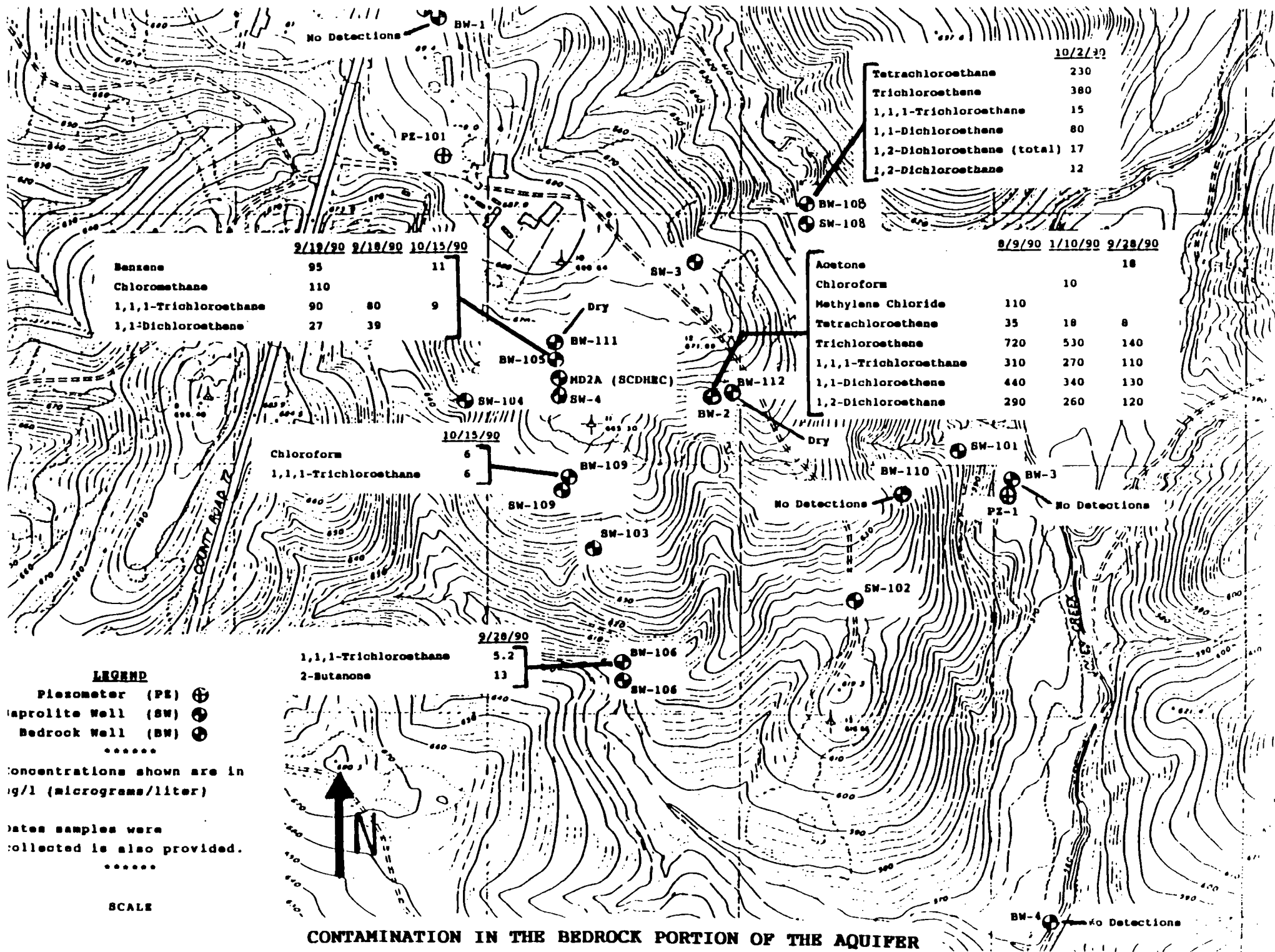
Planning + Related Info Deleted

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REMEDIAL INVESTIGATION FINDINGS

- **SOILS IN THE IMMEDIATE VICINITY OF DISPOSAL AREAS ARE CONTAMINATED WITH VOCs AND SVOCs**
- **GROUNDWATER IN BOTH THE SAPROLITE AND BEDROCK BENEATH AND DOWNGRAIENT OF THE SITE ARE CONTAMINATED WITH VOCs**
- **INORGANICS (METALS) DO NOT POSE A RISK**
- **GROUNDWATER IS MOVING IN A SOUTHEASTERLY DIRECTION AND THE SPROUSE WELL IS HYDRAULICALLY UPGRADIENT OF THE SITE**
- **NO CONTAMINANTS HAVE BEEN DETECTED IN JONES CREEK**





10/2/90

Tetrachloroethane	230
Trichloroethane	380
1,1,1-Trichloroethane	15
1,1-Dichloroethane	80
1,2-Dichloroethane (total)	17
1,2-Dichloroethane	12

8/9/90 1/10/90 9/28/90

Acetone			18
Chloroform		10	
Methylene Chloride	110		
Tetrachloroethane	35	18	8
Trichloroethane	720	530	140
1,1,1-Trichloroethane	310	270	110
1,1-Dichloroethane	440	340	130
1,2-Dichloroethane	290	260	120

2/19/90 2/19/90 10/15/90

Benzene	95		11
Chloromethane	110		
1,1,1-Trichloroethane	90	80	9
1,1-Dichloroethane	27	39	

10/15/90

Chloroform	6
1,1,1-Trichloroethane	6

9/28/90

1,1,1-Trichloroethane	5.2
2-Butanone	13

LEGEND

- Piezometer (PE) ⊕
- Saprolite Well (SW) ⊙
- Bedrock Well (BW) ⊙

Concentrations shown are in
µg/l (micrograms/liter)

Dates samples were
collected is also provided.

SCALE

CONTAMINATION IN THE BEDROCK PORTION OF THE AQUIFER

**CHEMICALS DETECTED IN SURFACE SOIL
MEDLEY FARM SITE**

Chemical	Frequency of Detection	Range of Detected Concentrations (ug/kg)^(c)
<u>Volatile Organic Compounds^(a)</u>		
*1,1,2-Trichloroethane	2/13	110-160
*1,1,2,2-Tetrachloroethane	2/13	85-91
*1,2-Dichloroethene (total)	6/13	4-200
*1,2-Dichloropropane	1/13	21
Chlorobenzene	1/13	3
Chloroform	1/13	3
*Ethylbenzene	2/13	7-33
*Methylene Chloride	11/13	2-23
*Styrene	2/13	3-11
*Tetrachloroethene	4/13	5-69
Toluene	1/13	1
*Trichloroethene	4/13	7-70
*Vinyl Chloride	4/13	25-210
<u>Semi-Volatile Organic Compounds^(b)</u>		
1,2-Dichlorobenzene	2/15	190-200
*1,2,4-Trichlorobenzene	4/15	810-1200
2-Methylnaphthalene	2/15	140-160
*Butylbenzylphthalate	5/15	140-1100
*Di-n-butylphthalate	4/15	78-1100
*Di-n-octylphthalate	4/15	3600-5400
Diethylphthalate	1/15	110
*bis(2-Ethylhexyl)phthalate	6/15	82-33,000
<u>Pesticides/PCB</u>		
*Toxaphene	2/13	330-520 ^(d)
*PCB-1254	3/13	200-1900

* Chemical of potential concern

^(a)Volatile organic compounds and pesticides/PCB are based on data from the following samples: HA-1 thru HA-12, and HA-6-A.

^(b)Semi-volatile organic compounds are based on data from the following samples: HA-1 thru HA-12, HA-6-A, HA-16, and HA-16-A.

^(c)The range of detected concentrations include estimated results (chemical concentrations less than the contract-required quantitation limit).

^(d)Duplicate samples taken at same location.

CHEMICALS DETECTED IN GROUND WATER - BEDROCK WELLS
MEDLEY FARM SITE

Chemical	Frequency of Detection	Range of Detected Concentrations (ug/l) ^(a)
<u>Volatile Organic Compounds</u>		
*1,1-Dichloroethene	6/15	2.2-440
1,1-Dichloroethane	2/15	2-3
*1,1,1-Trichloroethane	9/15	4-310
*1,1,2-Trichloroethane	1/15	3
*1,2-Dichloroethane	5/15	12-290
1,2-Dichloroethene (total)	2/15	2-17
*2-Butanone	4/15	6.8-13
*Acetone	3/15	1-18
*Benzene	1/15	11
Carbon Disulfide	1/15	4
Chlorobenzene	1/15	1
*Chloroform	6/15	4-7
Chloromethane	1/15	2
*Methylene Chloride	3/15	48-110
*Tetrachloroethene	5/15	8-230
Toluene	2/15	3-5
*Trichloroethene	5/15	140-720

Semi-Volatile Organic Compounds

None detected

* Chemical of potential concern

^(a)Detected concentrations include estimated results (chemical concentrations less than the contract-required quantitation limit).

FINDINGS OF THE RISK ASSESSMENT (BASELINE CONDITIONS)

- **NO PRESENT SIGNIFICANT CARCINOGENIC RISK DUE TO EXPOSURE TO SITE-RELATED CHEMICALS AT THE SITE THROUGH ANY OF THE ENVIRONMENTAL MEDIA**
- **PRELIMINARY ASSESSMENT SHOWS THERE IS NO POTENTIAL FOR SIGNIFICANT RISK TO WILDLIFE POPULATIONS**
- **PRPs NEED TO RE-EVALUATE THE FUTURE RISK SCENARIO FOR HUMAN CONSUMPTION OF CONTAMINATED GROUNDWATER**

OVERVIEW OF THE FEASIBILITY STUDY

POTENTIAL GROUNDWATER REMEDIATION TECHNOLOGIES

NO ACTION (NATURAL ATTENUATION)

GROUNDWATER RECOVERY

EXTRACTION WELLS

SUBSURFACE DRAIN AND INTERCEPTION TRENCHES

ALTERNATIVE CONCENTRATION LIMITS

TREATMENT OF GROUNDWATER

AIR STRIPPING

GRANULAR ACTIVATED CARBON

CHEMICAL OXIDATION (UV-OZONE)

BIOLOGICAL TREATMENT

LAND TREATMENT

DISCHARGE OF EXTRACTED GROUNDWATER

SURFACE WATER DISCHARGE

GAFFNEY PUBLICLY OWNED TREATMENT WORKS

HORIZONTAL IRRIGATION

INJECTION WELLS

**TABLE 3.3
GROUND WATER CONTROL
TECHNOLOGY SUMMARY**

TECHNOLOGY

STATUS

REASON

GROUNDWATER RECOVERY

EXTRACTION WELLS
SUBSURFACE DRAINS/
INTERCEPTION TRENCHES
ACLs
NO ACTION

RETAINED

REJECTED
REJECTED
RETAINED

CANNOT BE INSTALLED AT DEPTH IN BEDROCK
SITE CONDITIONS NOT APPROPRIATE

GROUNDWATER TREATMENT

ACTIVATED CARBON ADSORPTION
CHEMICAL OXIDATION
BIOLOGICAL SYSTEM
AIR STRIPPING
LAND APPLICATION

RETAINED
RETAINED
REJECTED
RETAINED
REJECTED

CHLORINATED VOCs RESISTANT TO BIODEGRADATION

RESISTANT COMPOUNDS, SEASONAL USE

GROUNDWATER DISCHARGE

SURFACE WATER (JONES CREEK)
GAFFNEY POTW
INFILTRATION GALLERY
INJECTION WELL

RETAINED
REJECTED
RETAINED
RETAINED

DISTANCE TO SERVICE
PROVISIONALLY DEPENDING ON APPLICATION RATES
PROVISIONALLY DEPENDING ON APPLICATION RATES

POTENTIAL REMEDIAL ALTERNATIVES

ALTERNATIVE

DESCRIPTION

GROUNDWATER CONTROL

GWC-1	NO ACTION
A	NO ADDITIONAL ACTIVITIES
B	INSTITUTE LONG-TERM GROUNDWATER MONITORING
GWC-2	RECOVERY OF ALL GROUNDWATER ABOVE MAXIMUM CONCENTRATION LEVELS
A	TREATMENT USING AIR STRIPPING
B	TREATMENT USING CARBON ADSORPTION
C	TREATMENT USING CHEMICAL OXIDATION
GWC-3	RECOVERY OF ALL GROUNDWATER THAT COULD EXCEED MCLs AT THE PROPERTY LINE
A	TREATMENT USING AIR STRIPPING
B	TREATMENT USING CARBON ADSORPTION
C	TREATMENT USING CHEMICAL OXIDATION

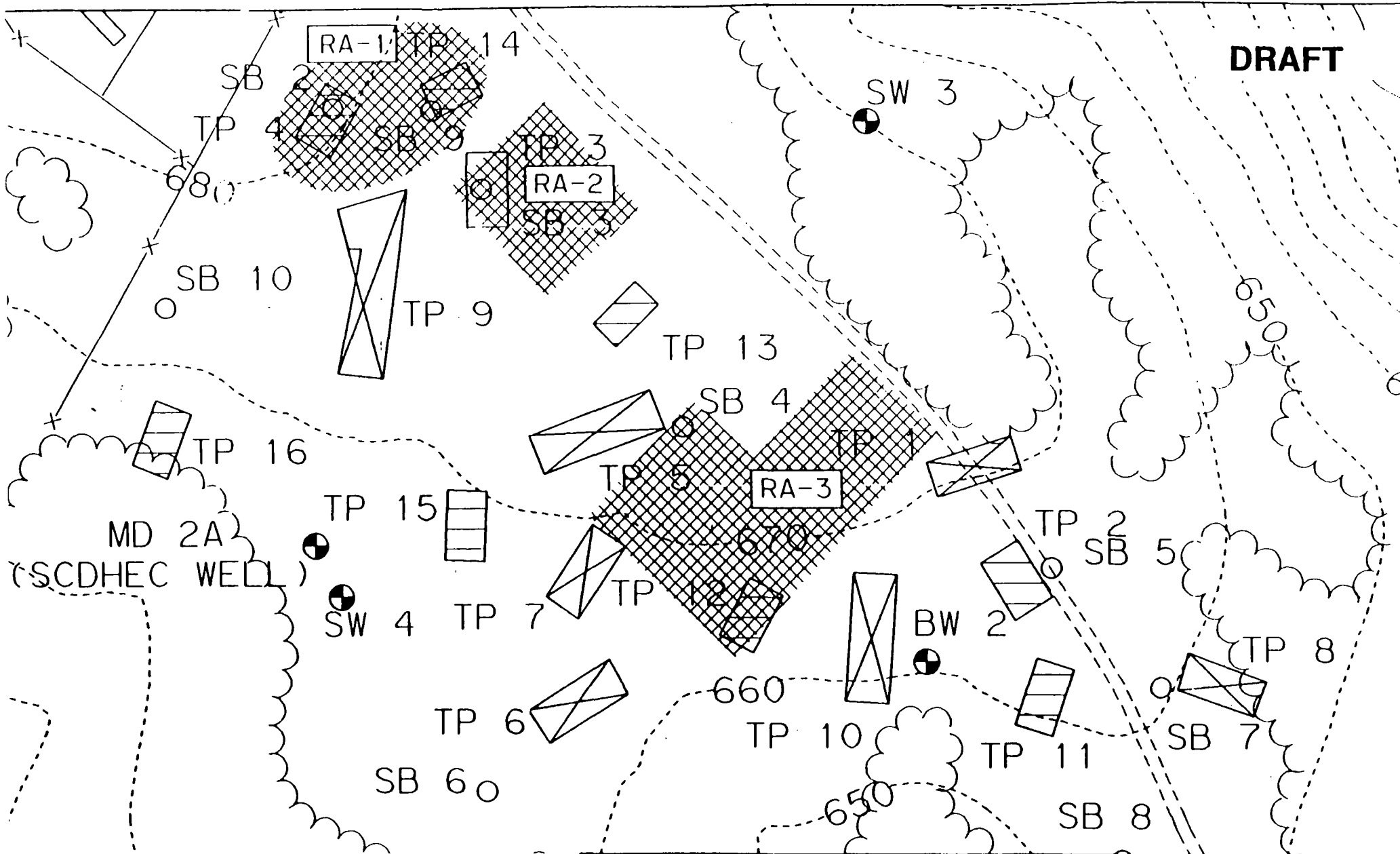
SOURCE CONTROL

SC-1	NO ACTION
SC-2	CAPPING SOURCE AREA

RETAINED ALTERNATIVES FOR DETAILED ANALYSIS

<u>ALTERNATIVE</u>	<u>DESCRIPTION</u>	<u>PRESENT WORTH COSTS</u>
GWC-1A	NO ACTION FOR GROUNDWATER	\$100,000
GWC-1B	NO ACTION; LONG-TERM MONITORING	\$440,000
GWC-2A	MCLs ACROSS SITE; AIR STRIPPING	\$1,600,000
GWC-3A	MCLs AT PROPERTY LINE; AIR STRIPPING	\$1,300,000
SC-1	NO ACTION FOR SOURCE CONTROL	\$100,000
SC-2	CAP SOURCE AREA	\$810,000
SC-3	SOIL VAPOR EXTRACTION	\$620,000

DRAFT



EXCEEDS SUBSURFACE LEVELS FOR VOCs



Greenville, South Carolina

FIGURE 4.2
APPROXIMATE EXTENT OF
SOURCE AREAS EXCEEDING
CALCULATED SOIL REMEDIATION
LEVELS
MEDLEY FARM SITE

FOR FURTHER INFORMATION ABOUT THIS SITE

Mr. Jon K. Bornholm
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Mr. Thom Berry
Director, Division of
Media Relations
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Ms. Cynthia Peurifoy
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Coordinator
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Protection Agency
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Atlanta, Georgia 30365
(404) 347-7791

ATTACHMENT C - ATTENDANCE LIST

APPENDIX C: LIST OF MEETING ATTENDEES

<u>Name</u>	<u>Address</u>
Doug Blanstt	SCDHEC, Div. of Health and Hazard Evaluation Columbia, SC 29201
Cody Sossaman	Gaffney Ledger Gaffney, SC
T. Pierre	WYFF-TV 4N/A
T. Valerio	National Starch and Chemical Co. 10 Finderne Avenue Bridgewater, NJ 08807
Jim Chamness	Sirriner Environmental P.O. Box 24 Greenville, SC 29687
Fred Spencer	Gaffney, SCN/A
Phil Sarata	WAGI-FM Gaffney, SC 29340
Matt Stahl	Spartanburg Herald-Journal 313 1/2 N. Limestone St. Gaffney, SC 29240
Scott T. Peeler	
Jimmie G. Peeler	
Ed Gregory	SCDHEC, Div. of Health and Hazard Evaluation Columbia, SC 29201
Evelin Henderson	WSPA Radio
Mark Henderson	WSPA Radio
Angela Gorman	SCDHEC, Div. of Health and Hazard Evaluation Columbia, SC 29201
Richard Haynes	SCDHEC, Div. of Health and Hazard Evaluation Columbia, SC 29201
Yanging Mo	SCDHEC, Div. of Health and Hazard Evaluation Columbia, SC 29201

Note: None of the meeting attendees requested to be added to the mailing list.

ATTACHMENT D - COPY OF PUBLIC NOTICES

**THE U.S. ENVIRONMENTAL PROTECTION AGENCY
INVITES PUBLIC COMMENT ON
THE ADMINISTRATIVE RECORD AND PROPOSED PLAN FOR THE
MEDLEY FARM SUPERFUND SITE
IN CHEROKEE COUNTY, SOUTH CAROLINA
Tuesday, February 12, 1991 at 7:00 p.m.
Gaffney High School Cafeteria
(803) 488-2544**

Public Meeting

The U.S. Environmental Protection Agency (EPA) will hold a public meeting on Tuesday February 12, 1991, at 7:00 p.m. in the Gaffney High School cafeteria, at 806 E. Fredrick Street, Gaffney, South Carolina. The purpose of the meeting will be to discuss the Proposed Remedial Action Plan including the preferred action alternative designed to address contamination at the Medley Farm Superfund Site. Other cleanup alternatives which were evaluated in the Feasibility Study (FS) will also be reviewed. The public is encouraged to attend, ask questions, and offer comments at the meeting.

The Medley Farm Superfund Site occupies a 7-acre tract of land off Highway 72, about 6 miles south of the City of Gaffney. During the period from 1973 to 1978, textile, paint, and chemical manufacturing wastes were disposed of on the Medley Farm site. In May 1983, EPA conducted sampling at the Site and performed an emergency removal action in the following month. After negotiations with EPA, five of the potentially responsible parties (PRPs) agreed to fund and carry out the Remedial Investigation/Feasibility Study (RI/FS) for the Site. The draft RI was presented to EPA in March 1989, and the Site was placed on the National Priorities List (NPL) for a Superfund cleanup. Based on the RI findings, the EPA has reviewed nine alternatives for addressing groundwater and surface contamination at the Site.

Preferred Alternative

The preferred alternative for cleanup involves:

- o Recovery of all ground water that exceeds maximum concentration levels and treating the extracted ground water prior to discharging to Jones Creek through an air stripping tower; and
- o Soil vapor extraction in areas exceeding calculated and remediation levels. If levels of contaminants in the extracted air are above those allowed by either the Clean Air Act and/or the South Carolina Pollution Control Act, then the extracted vapors will be passed through an activated carbon unit prior to being released to the environment.

Other Alternatives

Other remedial alternatives under consideration include:

- o No action
- o Treatment of ground water using carbon absorption
- o Treatment of ground water using chemical oxidation
- o Treatment of ground water at property line using the same three options listed above
- o Capping the surface areas.

These alternatives are presented fully in the FS.

Public Comment Period

EPA hereby announces a 30-day public comment period, from February 13 to March 14, 1991, during which time the public is invited to review and comment on the Administrative Record, including the Proposed Plan, RI, and FS reports. Selection of the final remedy will be made after consideration of all public comments on the RI/FS and the Proposed Plan, and will be documented in the Record of Decision for the Site.

Information Requesters

The Administrative Record, including the Proposed Plan and RI/FS documents, is available for public review at the following location:

Cherokee Public Library
229 E. Rutledge Street
Gaffney, SC 29540

Hours
Monday & Tuesday: 10 am-4 pm
Wednesday - Friday: 10 am-4 pm
Saturday: 10 am-4 pm

Contact: Ms Anna Manning
(803) 487-2711

Additional Information

If, after reviewing the Site information, you would like to comment in writing on EPA's preferred or other alternatives, or other issues relevant to the Site cleanup, please mail your written comments to:

Mr. Jan Bernholm
Community Relations Coordinator
U.S. Environmental Protection Agency
Region IV
346 Courtland Street, N.E., Atlanta, GA 30303
(404) 347-7701

Mr. Bernholm may also be contacted for further information about the Site, or for questions regarding the public meetings or opportunities for public participation.

2 29940-0

CNC

partments
ully equipped
er, units, re-
L-400, Ann.

2040—Adult/Child Care

Live in with elderly gentleman
near Simpsonville. Not bedridden.
Call Ladd S. Johnson 773-1571, 8-10



LEGAL NOTICES

The public comment period has been extended for an additional thirty days and will end on April 13, 1991.

The Proposed Plan outlines EPA's preferred cleanup alternative for the site, as well as other cleanup alternatives that were evaluated in the Feasibility Study conducted for the site. The preferred alternative for cleanup of the site includes:

Recovery of all ground water that exceeds maximum concentration levels and treating the extracted ground water prior to discharging to Jones Creek through an air stripping tower; and

Soil vapor extraction in areas exceeding calculated soil remediation levels. If levels of contaminants in the extracted air are above those allowed by either the Clean Air Act and/or the South Carolina Pollution Control Act, the extracted vapors will be passed through an activated carbon unit prior to being released to the environment.

The Medley Farm Superfund Site occupies a seven acre tract of land off Highway 72, about six miles south of the City of Gaffney. During the period from 1973 to 1978, textile, paint and chemical manufacturing wastes were disposed of on the Medley Farm site.

The Administrative Record, which includes the Proposed Plan and the Remedial Investigation/Feasibility Study documents, is available for public review at the following location:

Cherokee Public Library
300 E. Rutledge Street
Gaffney, South Carolina
(803) 487-2711

Hours:

Monday & Tuesday, 10am-4pm
Wed.-Friday, 10am-4pm
Saturday, 10am-4pm

If after reviewing the information on the site, you would like to comment in writing on EPA's preferred alternative, any of the other cleanup alternatives under consideration, or other issues relevant to the site's cleanup, please mail your comments to:

Jon Barnholm
Remedial Project Manager
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, GA 30365
(404) 347-7791

Written comments must be postmarked no later than April 13, 1991. Mr. Barnholm may be contacted at the number above for further information about the site. 2658354.

THE U.S. ENVIRONMENTAL PROTECTION AGENCY ANNOUNCES EXTENSION OF THE PUBLIC COMMENT PERIOD ON THE PROPOSED PLAN AND ADMINISTRATIVE RECORD FOR THE MEDLEY FARM SUPERFUND SITE IN CHEROKEE COUNTY, SOUTH CAROLINA

The U.S. Environmental Protection Agency has extended the public comment period on the Proposed Remedial Action Plan and the Administrative Record for the Medley Farm Superfund site in Cherokee County, South Carolina.

298-4221



Legal Notices	7B
Manufactured Housing	4
Merchandise	2
Real Estate	4
Recreation	5
Rentals	3
Services	2
Transportation	5
Yard/Garden/Farm	3

1030—Lost & Found

FOUND: BLACK CAT
With no tail. Has flea collar.
CALL 232-7476.

FOUND: Cocker Spaniel, GE plant area. Call to identify 234-4638 or 244-9066 even.

1030—Lost & Found

FOUND: Mixed breed black & white, short hair, friendly dog. About 1 yr. old. 859-1844.

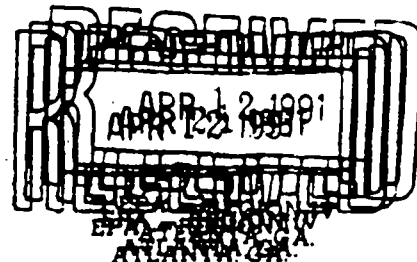
FOUND: Orange 1 or 2 yrs. old male neutered cat in Sugar Creek II. Call 244-8547

ATTACHMENT E - WRITTEN COMMENTS RECEIVED BY EPA

KING & SPALDING

191 PEACHTREE STREET
ATLANTA, GEORGIA
30303-1763

404/572-4800
TELEX: 54-2917 KINGSPALD ATL
TELECOPIER: 404/572-5100



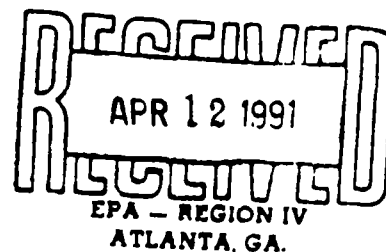
1730 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, DC 20006
TELEPHONE: 202/737-0500
TELECOPIER: 202/626-3737

April 12, 1991

745 FIFTH AVENUE
NEW YORK NY 10151
TELEPHONE: 212/758-8700
TELECOPIER: 212/593-3673

VIA HAND DELIVERY

Mr. Jon K. Bornholm
Remedial Project Manager
United States Environmental
Protection Agency, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365



Re: Medley Farm Site

Dear Mr. Bornholm:

I am writing on behalf of the Medley Farm Site Steering Committee. In accordance with the National Contingency Plan, the Steering Committee hereby submits comments on the Environmental Protection Agency's ("EPA") proposed plan for remedial action at the Medley Farm Site ("the Proposed Plan").

The Proposed Plan calls for:

- °recovery and treatment of groundwater that exceeds maximum contaminant levels at the Site; and
- °soil vapor extraction to remove residual source contamination.

EPA has concluded that the low levels of contamination remaining in the soils at the Site pose no significant risk to human health and the environment. Nonetheless EPA has proposed that the soils be remediated through soil vapor extraction (SVE) to speed and enhance the groundwater remediation at the Site. The Steering Committee and its consultant, Sirrine Environmental Consultants, do not agree that soil remediation should be required in addition to direct groundwater remediation.

Almost all soil contamination was removed in the emergency removal action in 1983. The residual soil contamination remaining at the Site will naturally flush through and be captured by the

groundwater recovery and treatment system with no significant impact on the operational life of that system. Groundwater remediation alone will result in a permanent reduction of Site contaminants. The proposed soil vapor extraction remedy would, therefore, add to the cost of remediation at the Site without appreciably reducing the potential risks posed by the Site or the length of time for full remediation to eliminate those potential risks.

The Steering Committee believes that soil vapor extraction should be eliminated from the plan for remedial action. We propose that EPA instead select natural flushing combined with groundwater recovery and treatment as the remedy for the Site. The effectiveness of this remedy will be reviewed after five years of implementation. The impact of natural flushing on the groundwater remediation can be evaluated more effectively at that time. At this point, the estimated impact is not significant enough to require a source control remedy such as soil vapor extraction.

The Steering Committee's position and alternative proposal are discussed more fully in the attached comments. The Steering Committee and Sirrine are available to answer any questions you might have.

Sincerely,

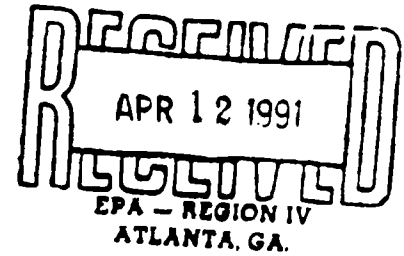

Mary Jane Norville

MJN:lwb

Attachment

cc: Elaine Levine (w/attachment)
Keith Lindler (w/attachment)
Jim Cloonan (w/attachment)
Jim Chamness (w/attachment)
Medley Farm Site Steering Committee (w/attachment)

COMMENTS ON PROPOSED PLAN
FOR REMEDIAL ACTION AT THE
MEDLEY FARM SITE



APRIL 12, 1991

SUBMITTED

BY

THE MEDLEY FARM SITE STEERING COMMITTEE

BACKGROUND

The U.S. Environmental Protection Agency (EPA) released a proposed plan for remediation of the Medley Farm Site ("Site") in Gaffney, South Carolina on February 7, 1991. The preferred remedy involves:

Treatment Using Air Stripping: Recovery of all ground water above maximum contaminant levels ("MCLs") and treating the extracted ground water prior to discharging to Jones Creek through an air stripping tower (Alternative GWC-2A); and

Soil Vapor Extraction: Soil vapor extraction in areas exceeding calculated soil remediation levels. If necessary to comply with applicable portions of the Clean Air Act and the South Carolina Pollution Control Act, the extracted vapors will be controlled using an activated carbon unit (Alternative SC-3).

The Medley Farm Site Steering Committee ("the Steering Committee") represents the parties who agreed under an Administrative Order by Consent to perform the Remedial Investigation/Feasibility Study ("RI/FS") for the Site. SIRRINE Environmental Consultants ("SIRRINE") served as the Steering Committee's consultant for performance of the RI/FS. The Steering Committee and SIRRINE have reviewed the proposed plan. The Steering Committee hereby submits comments on the plan and requests consideration of changes in the plan based on these comments.

Specifically, the Steering Committee and Sirrine believe that active remediation of Site soils is not necessary or cost-effective. The rationale for their disagreement with the proposed plan and a proposed alternative are set forth below.

OBJECTION TO REMEDY: NECESSITY OF SOURCE CONTROL

The great majority of chemical residuals at the Site were removed during the immediate removal action in 1983. Remaining contaminants in soils consist of low levels (generally less than 1 mg/kg) of primarily volatile organic compounds (VOCs). The baseline risk assessment determined that Site soils do not pose a significant risk to human health or the environment through a direct pathway.

The only risk posed by Site soils is the indirect risk that occurs through the leaching of VOCs from certain areas of soils into groundwater. As rainwater infiltrates the soils, the VOCs are naturally flushed in the groundwater (Alternative SC-1). VOCs in groundwater can then be recovered using extraction wells and treated (Alternative GWC-2A). Consequently, when the groundwater extraction system is operational, site soils will no longer pose a risk to potential receptors either directly or indirectly.

Remediation of Site soils is not necessary to protect human health or the environment from direct or indirect risks. All Site soils are less than the TSCA remediation level of 10 mg/kg for PCBs, the

The following section provides details on the accumulative community relations efforts conducted by the Agency. Information Repositories/Administrative Records were established at the Cherokee County Public Library in Gaffney and in the EPA, Region IV Regional Information Center in Atlanta, Georgia. A Community Relations Plan identifying a positive public outreach strategy was developed. The primary vehicle of disseminating information to the public was through fact sheets and public meetings.

The first two Fact Sheets were distributed to the public during the latter part of 1988. The first Fact Sheet, released in October 1988, provided pertinent background and historical information, and a brief description of the Superfund process. The second Fact Sheet, distributed in December 1988, described the upcoming RI field activities and provided a schedule of work.

Following the submittal of the draft RI report to the Agency by the PRPs on March 30, 1990, a third Fact Sheet was prepared. This Fact Sheet, distributed in May 1990, highlighted the findings/conclusions stated in the draft RI report. Due to the data deficiencies identified in the draft RI report, a fourth Fact Sheet was mailed to inform the public that a second phase, Phase II, of the RI was necessary. Following the completion of Phase II and the submittal of the revised RI report on November 30, 1990, another Fact Sheet was prepared and distributed to the public in January 1991. This Fact Sheet highlighted the findings/conclusions stated in the revised RI report. Shortly after distributing this Fact Sheet, the Proposed Plan Fact Sheet was sent out to the public on February 8, 1991.

In addition to the distribution of these fact sheets, the Agency conducted three public meetings. The first public meeting, the "Kick-Off" meeting, was held on January 9, 1989. A second public meeting was held on May 24, 1990 to share with the public the information presented in the draft RI and inform the public of the upcoming activities and provide a schedule for these activities. The Proposed Plan public meeting was held on February 12, 1991.

Public notices highlighting the proposed plan and availability of the administrative record appeared in the Greenville News on February 10, 1991. Another notice announcing the extension to the public comment period also appeared in the Greenville News on March 19, 1991. A copy of these public notices can be found in Attachment D.

PART I: SUMMARY OF MAJOR ISSUES AND CONCERNS RECEIVED AS COMMENTS

This section provides a summary of major issues and concerns received as comments, and expressly acknowledges and responds to those raised by the local community. The major issues and concerns on the proposed remedy for the Medley Farm Site received at the public meeting on February 12, 1991, and during the public comment period, can be grouped into three areas:

- A. Identification and involvement of PRPs,
- B. Cleanup costs, and
- C. Selection of a remedy.

A summary of the comments and EPA's responses are provided below. A complete transcript of concerns raised during this segment of the meeting, along with the responses, is included on pages 14-18 of the meeting transcript (Attachment A). Jon Bornholm, Remedial Project Manager for EPA, Region IV, responded to all questions.

A. Identification and Involvement of PRPs

Q: What companies, individuals, or other parties have been named as PRPs and will there be any criminal charges filed against them?

A: According to the Administrative Order, the following parties were named prior to the Risk Assessment: Milliken and Company; Unisphere Chemical Corporation; National Starch and Chemical Corporation; ABCO; BASF Corporation; Polymer Industries; Tanner Chemical Company, and; Ethox Chemical, Inc. The Medleys, including Ralph and Clyde Medley, were subsequently added to the list. To the best of my knowledge, I do not know if there will be any criminal charges filed against them.

Q: Is the Agency going to recover the cost of the initial cleanup from the PRPs?

A: The majority of the cleanup costs is coming from the PRPs and has been recovered. The PRPs have paid for all the investigation work completed to date. The only costs the government has incurred right now are oversight costs, and EPA will also be seeking to recover those costs from the PRPs.

Q: Will the EPA have to enter into negotiations with the PRPs?

A: After the Agency publishes its decision, it then issues special notice letters to all of the identified PRPs to begin negotiations on the RD and RA, which usually lasts six months. A Consent Decree, summarizing the results of those negotiations, is then produced and becomes a record in the Federal court system. If a decision cannot be reached during the six-month period of negotiations, the EPA will issue a Unilateral Administrative Order (UAO), forcing the PRPs to implement a new RD and RA. If the PRPs refuse to comply with the UAO then Superfund will be implemented and the PRPs will become liable for further damages.

B. Cleanup Costs

Q: How much is the cost of the cleanup?

A: The FS presented several scenarios. The 10-year and 30-year scenarios for the extraction and treatment of groundwater are estimated to be \$1.2 million and \$1.9 million, respectively. The

cost to treat the source through soil vapor extraction is set at \$550,000, a process which is estimated to be complete in one year. Therefore, the total present cost for the 10-year and 30-year scenarios for groundwater extraction and treatment with soil vapor extraction is \$1.8 million and \$2.4 million, respectively.

Q: What is the significance of the 10-year and 30-year scenarios?

A: The remediation of groundwater is not a science. Sirrine Environmental Consultants estimated that it will take 20 years, under natural conditions, for the flushing of soils by rain to clean the soils down to a level where there is no longer any natural groundwater. Over those 20 years, the groundwater also will be treated to remove those contaminants entering it. The purpose of the soil vapor extraction system is to shorten the period where organics are allowed to enter the groundwater. The selected RA would cost at least \$1.8 million for the 10-year scenario and \$2.4 million for the 30-year scenario.

C. Selection of Remedy

Comment:

"Soil vapor extraction (SVE) (Alternative SC-3) should be eliminated from the plan for remedial action because it is neither necessary for compliance with ARARs nor cost-effective". According to the entity commenting, the great majority of chemical residues at the Site were removed during the immediate removal action in 1983. The entity commenting noted three problems with the proposed remedy:

- Site conditions are consistent with aquifer and contaminant characteristics that are likely to prolong aquifer restoration. Therefore, the time necessary for cleanup will apply to pump and treat the groundwater after the natural flushing period is underestimated in the EPA proposal;
- Remediation is not necessary for compliance with ARARs because all Site soils are less than the TSCA remediation level and they do not pose a significant risk to human health or environment; and
- The estimated costs for remediation do not consider the longer remediation period required for the EPA preferred remedy, therefore cost savings are not accurate".

The entity commenting proposed that EPA instead use natural flushing (Alternative SC-1) combined with groundwater recovery and treatment (Alternative GWC-2A) as the remedy for the Site. The entity commenting suggests that groundwater extraction alone can prevent potential future risks, is technically justifiable based on EPA experience, and in conjunction with natural flushing is the most cost-effective remedy for the Site.

only identified ARAR for Site soils. Therefore, remediation of Site soils is not necessary for compliance with ARARs. Natural flushing (Alternative SC-1) satisfies the threshold criteria given by the National Contingency Plan ("NCP") for Protection of Human Health and the Environment and Compliance with ARARs. Natural flushing is therefore a protective alternative that is eligible for selection as a source control remedy.

Once the threshold criteria are satisfied, selection of a source control remedy must be determined from among the NCP's primary balancing criteria. Although the removal of VOCs from Site soils might be accelerated through soil vapor extraction (SVE; Alternative SC-3), the efficacy of SVE depends on whether it would decrease the time required for overall (soils and groundwater) Site remediation and therefore be cost effective as compared to pump-and-treat alone (i.e., natural flushing).

The primary balancing criteria are:

- ° long-term effectiveness and permanence
- ° reduction of toxicity, mobility and volume
- ° short-term effectiveness
- ° implementability
- ° cost

Evaluation of source control measures must be considered in the context of the overall Site remedy, including groundwater extraction and treatment. In this perspective, natural flushing

rates favorably within the balancing criteria. Natural flushing would effect a permanent reduction in the volume of VOCs in soils. These VOCs would then be recovered by the groundwater extraction system and treated, resulting in a net reduction in the toxicity and volume of Site VOCs. Natural flushing can be readily implemented and would pose no risks to the community or the environment during implementation. As discussed below, natural flushing is more cost effective than soil vapor extraction (Alternative SC-3). Alternative SC-1 therefore achieves the best aggregate agreement with the primary balancing criteria from among the source control alternatives.

ESTIMATED DURATION OF GROUNDWATER EXTRACTION: CASE HISTORIES

Given that soils do not pose a significant risk at the Site, the only reason for source control is if it would accelerate the overall remediation of the Site. The Committee and Sirrine do not believe that a source measure, such as SVE, will effect a significant reduction in the time required to achieve remediation levels in groundwater.

A number of recent EPA publications describing actual groundwater remediation experiences indicate that remediation levels would not be achieved long after theoretical models had predicted site restoration. A sampling of EPA documents describing the protracted periods for groundwater remediation include:

- ° U.S. EPA Evaluation of Groundwater Extraction Remedies. Office of Solid Waste and Emergency Response; EPA/504/0289/054; Washington, DC, 1989.
- ° U.S. EPA. 1989. Consideration in Ground Water Remediation at Superfund Sites. Memorandum from Jonathan Cannon to EPA Regional Offices, Directive No. 9355-4-03, Office of Solid Waste and Emergency Response 1989.
- ° U.S. EPA. 1990. Evaluation of Ground Water Extraction Remedies, v. 2, Case Studies, EPA/540/2-89/054.
- ° U.S. EPA. 1989. Ground Water Issue, Performance Evaluation of Pump-and-treat Remediations. Office of Research and Development.
- ° Hall, C.W., "Limiting Factors in Ground Water Remediation", 20th Annual Conference on Environmental Law, March 1991, Keystone, Co. [NOTE: C.W. Hall is Director of EPA's Robert S. Kerr Environmental Research Laboratory.]

A review of EPA and other technical publications on groundwater remediation has concluded that restoration to MCLs is "currently unachievable" (Travis and Doty, 1990). The review determined that not "a single aquifer in the United States has been confirmed to be successfully restored through pumping and treating." A separate review article co-authored by EPA personnel (Haley, et al, 1991) identified the following impediments to achieving MCLs in relatively short time frames:

- ° sorption of contaminants to saturated soils
- ° aquifer properties, such as subsurface heterogeneity and fractures
- ° exceedingly low remediation levels
- ° presence of "stagnation zones" within the groundwater extraction system.

All of these conditions are applicable to the Site. VOCs at the Site have significant organic carbon/water partitioning coefficients, indicating a tendency to sorb to soils. The geology consists of a low conductivity saprolite, a higher conductivity transition zone, and fractured bedrock. Experience at other sites indicates that this heterogeneity will likely protract the time required for aquifer restoration due to differing contaminant desorption rates and discontinuities in hydraulic flow patterns. The collective effect of these factors is to all but guarantee that groundwater remediation at the Site may not achieve MCLs for decades since MCLs at the Site are generally at the low parts per billion range. While groundwater recovery and treatment will reduce contaminant levels significantly (90+%), MCLs will likely not be achieved in predictable time frames with or without source control.

Both review articles (Travis and Doty; Haley, et. al.) indicated that:

- ° plume containment and mass reduction should be primary objectives of groundwater remediation and

- ° that restoration of a heterogeneous aquifer to MCLs is not likely.

Numerous EPA documents based on a variety of case histories confirm the technical realization that groundwater remediation is apt to be a containment action that prevents migration. Since MCLs are not likely to be achieved with or without source control in a predictable period of time, and since soils without treatment present no direct risks to human health, the Steering Committee questions the need for active source control measures at the Site. Existing volatile organic compound (VOC) levels in groundwater are evidence that natural flushing is occurring. Contaminants will, therefore, be recovered and treated by the groundwater remediation system. The proposed groundwater remediation system, with or without source control, will reduce contaminant levels significantly. In addition, contaminants will also be contained from migrating beyond Site boundaries and prevent any future risks to potential downgradient receptors. A source control remedy is therefore not required for the remediation of Site soils.

OBJECTION TO REMEDY: COST-EFFECTIVENESS

The cost-effectiveness of SVE can best be evaluated by comparing its present worth costs with the additional groundwater remediation costs associated with natural flushing. Unsaturated transport modeling can be used to predict the time required for natural flushing to remediate Site soils. A batch flushing model can be used to estimate the groundwater remediation period

following SVE and natural flushing. The difference in remediation periods represents the additional groundwater remediation costs that SVE must be compared against.

Existing Groundwater: A batch flushing model (EPA, 1988) was used to estimate the time required to achieve MCLs under current groundwater conditions. Based on a 99.8 percent reduction of total VOCs in groundwater, remediation of Site groundwater is projected to take approximately 10 years assuming no flushing of additional contaminants into the groundwater. This time estimate is almost certainly low, as evidenced by the previous discussion regarding case histories and Site characteristics. A protracted groundwater extraction period would reduce any time and cost savings associated with SVE.

Soil Vapor Extraction: Remediation of Site soils to the remediation levels given in the FS (Table 4.3) would require approximately one year. SVE would be conducted concurrently with groundwater extraction.

Natural Flushing: Based on maximum site concentrations, adsorption to soils, and MCL value, trichlorethene (TCE) would determine the duration of natural flushing. The leaching potential of TCE can be estimated using the unsaturated transport model presented in the FS (Appendix E). Based on maximum soil concentrations at the Site, TCE is projected to impact groundwater above MCLs for approximately 20 years (see attached table).

Therefore, the time estimate projected for groundwater remediation assuming natural flushing with no SVE would be approximately 20 years.

Final Groundwater Extraction with Natural Flushing: Groundwater extraction would be required following completion of natural flushing to remove residual levels of VOCs. VOC levels after 20 years would be approximately at MCL levels (attached table), considerably lower than for current conditions. It is assumed that a 50 percent reduction in VOCs would be required following the completion of natural flushing to obtain MCLs. Using the batch flushing model, the additional groundwater extraction to achieve the 50 percent reduction would require approximately one year.

Final Groundwater Extraction with SVE: SVE is estimated to be completed within one year. Groundwater remediation under current conditions assuming no flushing of additional contaminants into groundwater has been estimated to take 10 years. VOC levels remaining after SVE could not impact groundwater above MCLs. No further groundwater extraction past 10 years would be anticipated if the remediation is accomplished as predicted by the batch-flushing model. Based on the lingering effects of residual VOC levels in groundwater, the extraction period of 10 years is likely an underestimate.

Summary: Natural flushing is projected to result in approximately 11 more years of groundwater extraction than if SVE were conducted. Since the model predicts that a minimum of 10 years of groundwater extraction would be required to achieve MCLs based on current groundwater conditions, the costs for additional groundwater extraction required to address further leaching would not begin until year 10. Experience with groundwater remediation at Superfund sites indicates that groundwater extraction and treatment under current conditions will not likely achieve MCLs within the 10 years projected by the model. The difference in groundwater extraction periods between SVE and natural flushing is therefore likely to be an overestimate.

COST EVALUATION

The total present worth costs (PWC) for SVE (Alternative SC-3) and annual groundwater remediation (Alternative GWC-2A) were estimated in the FS to be:

- ° SVE: \$620,000
- ° Annual groundwater remediation costs: \$81,000

The present worth costs for SVE must be compared with the present worth costs for the annualized series of groundwater remediation costs for the additional 11 years of operation. Calculation of the present worth costs for the additional groundwater remediation is a two step process:

- ° Convert the annual series to one cost at year 10.

° Convert the cost at year 10 to a present worth basis (year 0).

Present worth costs are evaluated at a discount rate of 5 percent, per EPA guidance. The calculation for the additional 11 years of groundwater remediation is:

$$\begin{aligned}\text{Groundwater remediation PWC} &= \$81,000 (P/A, 11, 5\%)(PF, 10, 5\%) \\ &= \$81,000 (8.306)(0.6139) \\ &= \$410,000\end{aligned}$$

COST EFFECTIVENESS DETERMINATION

The present worth costs for soil vapor extraction would be approximately \$620,000. The present worth costs to conduct an additional 11 years of groundwater remediation 10 years in the future, as required for natural flushing, would be approximately \$410,000. Natural flushing (Alternative SC-1) is therefore a more cost effective source control remedy for the Medley Farm Site than soil vapor extraction (Alternative SC-3). The estimated difference in present worth costs of approximately \$210,000 is almost certainly low since groundwater extraction at the Site will likely require more than the estimated 10 years to achieve MCLs with SVE.

Modeling predicts that aquifer restoration would require approximately 21 years through natural flushing and groundwater extraction. Both Site soils and groundwater would be at remediation levels at this time, thereby satisfying SARA's preference for a permanent remedy. The estimate of 10 years for aquifer restoration through SVE and groundwater extraction is

likely optimistic in light of EPA's evaluation of other groundwater remediation projects. The net result is that the apparent difference of 11 years for aquifer restoration through SVE is almost certainly overestimated and the difference in remedial time frames will be less. Any reduction in the differential time for remediation would increase the cost-effectiveness of natural flushing (Alternative SC-1).

OBJECTION TO REMEDY: CONCLUSIONS

- ° Direct remediation of Site soils (source control) is not required because site soils do not pose a significant risk to human health or the environment.
- ° The evaluation of groundwater remediation projects by EPA and independent authorities indicates that projections of aquifer restoration periods are greatly underestimated.
- ° Site conditions are consistent with aquifer and contaminant characteristics that are likely to prolong aquifer restoration.
- ° Natural flushing (Alternative SC-1) has estimated present worth costs that are approximately \$210,000 less than for SVE (Alternative SC-3). Because groundwater models tend to underestimate the time for aquifer restoration, the difference in costs is likely to be significantly higher.

- ° Active source control is not warranted for the Site based on risk, technical, or cost considerations.
- ° Groundwater extraction alone can prevent potential future risks, is technically justifiable based on EPA experience, and in conjunction with natural flushing is the most cost-effective remedy for the Site.

PROPOSED ALTERNATIVE

Knowledge of contaminant transport at the Site is based on two sampling events conducted under passive conditions (no remediation) and overly optimistic groundwater models. The Steering Committee proposes that a remedy involving natural flushing (Alternative SC-1) and groundwater control (Alternative GWC-2A) be initiated at the Site. The effects of leaching from soils and groundwater extraction can be evaluated at the 5-year review of remedy using results from regular monitoring events. Projections of the impact of soils on groundwater quality and aquifer restoration time frames can be conducted more effectively at that time. Should the results indicate a significant impact from soils and potential for achieving MCLs in groundwater, a pilot-test for SVE could be conducted to assess its site-specific effectiveness. Full-scale SVE could be implemented once the effectiveness was demonstrated and design parameters were established. This approach would be based on site-specific data and would allow the most demonstrated approach for selection of remedy. Since Site contaminants have been flushing into

groundwater for approximately 18 years, a review period of five years should have no appreciable effect on Site conditions (any variations in groundwater quality would be controlled by the extraction system). The absence of any risks to human health further validates the appropriateness of this approach.

REFERENCES

EPA, Guidance on Remedial Actions for Groundwater at Superfund Sites, EPA/540/G-88/003, Washington, DC, December 1988.

EPA, "Evaluation of Groundwater Extraction Remedies", EPA/504/0289/054, Washington, DC, 1989.

Haley, J.L. et al, "Evaluating the Effectiveness of Ground Water Extraction Systems", Ground Water Monitoring Review, Winter 1991, pp. 119-124.

Travis, C.C. and C.B. Doty, "Can Contaminated Aquifers at Superfund Sites Be Remediated?", Environmental Science and Technology, Vol., 24, No. 10, 1990, pp. 1464-1466.

ATTACHMENT F - LETTER FROM EPA TO STEERING COMMITTEE, DATED MAY 6, 1991



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET NE
ATLANTA GEORGIA 30365

MAY 06 1991

4WD-NSRB

Ms. Mary Jane Norville
King & Spalding
2500 Trust Company Tower
Atlanta, GA 30303

RE: Response to Comments On the Proposed Plan for the Medley
Farm Superfund Site

Dear Ms. Norville:

The Agency received comments on the Proposed Plan from the Potentially Responsible Parties (PRPs) on April 12, 1991. The Agency presented the Proposed Plan to the public during a public meeting held on February 12, 1991. This meeting initiated the public comment period which ended on April 13, 1991, after a 30-day extension to the initial 30-day comment period.

In the April 12 correspondence, the PRPs outline their objections to the rationale used by EPA in selecting Soil Vapor Extraction (SVE) as a source control remedial measure. Their objections centered on two main points:

- o They question the necessity of source control measures, since the Baseline Risk Assessment indicates that Site soil contaminants do not pose a direct risk. In addition, they point out that recent EPA and other technical documents conclude that the time frames for aquifer remediation are underestimated, and that true time frames will in fact always exceed those made using models. The PRPs believe that SVE will not shorten the estimated time required to remediate Site groundwater to MCLs.
- o A cost comparison between SVE with a pump-and-treat system, and natural flushing with pump-and-treat, led the PRPs to conclude that natural flushing was a more cost-effective remedy.

The Agency agrees that the risk posed by contaminated site soils is indirect, through leaching to the groundwater. In selecting the proposed alternative, the Agency considered the entire contaminated subsurface, both the saturated and

unsaturated zones, as an integrated whole. The rationale of this approach was to obtain cleanup goals as quickly as technically and economically feasible.

The Agency agrees that levels of contaminants across parts of the Site are less than 1 milligram per kilogram (mg/kg). However, the Feasibility Study (FS) proposed installing the SVE system in those areas of the Site where elevated levels of contaminants in the soils were encountered. These areas are defined in Figure 4.2 of the Feasibility Study.

The PRPs discussed thoroughly the ineffectiveness of pumping/extracting groundwater as a clean-up method for aquifers. The PRPs also emphasized that the time frames for remediating the groundwater are generally underestimated. They also quoted one publication which states that not "a single aquifer in the United States has been confirmed to be successfully restored through pumping and treating." Their discussion was based on a review of technical studies of groundwater remediation, including EPA studies.

The Agency does not dispute the findings of these studies. However, the underestimation of time required for aquifer cleanup applies not only to the pump-and-treat of groundwater with residual soil contaminants having been removed during the first year (SVE); it also applies to the pump-and-treat undertaken 20 years later to remove the last contaminants entering the groundwater (natural flushing). In addition, it should be pointed out that one particular conclusion quoted by the PRPs, that "plume containment and mass reduction should be primary objectives of groundwater remediation", does not correspond to either EPA policy or the requirements of the NCP at this time.

In this regard, the PRPs note that trichloroethene (TCE) "is projected to impact groundwater above MCLs for approximately 20 years" (page 8). This is the time estimated to be required for natural flushing to remove all TCE (and other contaminants) from the soil. It is then stated near the top of this page that "remediation of Site groundwater is projected to take approximately 10 years assuming no flushing of additional contaminants into the groundwater."

The concentrations of contaminants which will be entering the groundwater in the 20th year of natural flushing are not known. The PRPs' assumption that only a 50% reduction in the concentrations present in the groundwater will be needed may not hold true; as they point out, there are uncertainties associated with the assumptions required by the computer models.

Therefore, based on the above, for TCE that enters the

groundwater in the 20th year of natural flushing, the estimate could range up to another 10 years for the contaminant to be removed from the aquifer by the groundwater pump-and-treat system, depending on the levels present in the groundwater.

Based on these provisions, the comparison made on page 10 and page 11 should use more than 11 years as the difference in time frames between the natural flushing alternative and the SVE alternative:

20 yrs N. flushing (incl. 10 yrs pump/treat) + 1 yr pump/treat for last "50% reduction"	vs.	10 yrs pump/treat (includes SVE)
<hr/> 21 to ? yrs total		<hr/> 10 yrs total

The difference will be greater than 11 years: both values have the pump-and-treat "asymptote factor", described in the studies, which will cause them to be underestimates. But, the natural flushing alternative has an additional unknown: the length of additional pump-and-treat time necessary to remove the last TCE entering groundwater. The contaminant levels produced by this leaching will likely be very low, but still above MCLs: corresponding to those levels which take the longest to reduce. Additionally, if the attenuation/leaching model should also prove to have an "asymptote factor", contaminants may continue to enter the groundwater beyond 20 years, thus further delaying attainment of cleanup goals.

If only 5 years were required to bring residual concentrations down to MCLs, the additional costs for groundwater remediation at present worth costs (GR-PWC)* would be:

$$\begin{aligned}\text{GR-PWC} &= \$81,000 \text{ (P/A: 16, 5\%)} \text{ (P/F: 10, 5\%)} \\ &= \$81,000 (10.8378) (0.6139) \\ &= \underline{\$539,000}\end{aligned}$$

If 8 years were required, GR-PWC would equal \$601,000, and if 10 years were necessary, \$638,000.

The present worth cost for SVE is \$620,000. The estimated savings generated by natural flushing are thus not greater than \$200,000; rather, the estimate more likely ranges between 0 and \$81,000. Such savings, if valid, are not substantial when measured against the estimated total cost (net present worth) of the remedy: \$1.2 million (10 yrs), \$1.8 million (30 yrs).

* Same formula as used by PRPs.

These possible cost savings are not enough to justify selecting natural flushing as a source control remedy, which essentially equates to a "No Action" remedy for the contaminated soil areas.

In selecting a remedy, the Agency must evaluate two other criteria not mentioned by the PRPs. These are:

- o state acceptance/input
- o community acceptance/input

State and community representatives will not support this type of "No Action" scenario. The South Carolina Department of Health and Environmental Control (SCDHEC) has already verbally concurred with, and supports, the selected remedy.

Additionally, technical recommendations were considered. Two EPA technical publications which concern pump-and-treat systems are:

- o Basics of Pump-and-Treat Ground-Water Remediation Technology. EPA/600/8-90/003, March 1990.
- o Evaluation of Ground-Water Extraction Remedies. EPA/540/2-89/054, September 1989.

The latter document was referenced in the PRPs' comments. Both of these documents make clear recommendations that any and all residual source areas, whether above or below the water table, be removed or addressed by another treatment system. Use of multiple treatment technologies, such as that outlined in the remedy selected for this site, is common at CERCLA sites. In both documents, the recommendations are offered as methods to enhance and improve the effectiveness of pump-and-treat systems.

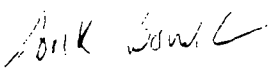
These recommendations, and the documents in general, support the Agency's opinion that, given the uncertainties associated with pump-and-treat remediation of contaminated groundwater, it makes sound economic and environmental sense to prevent or at least minimize the contaminant mass from moving from the unsaturated zone to the saturated zone, rather than waiting for the contamination to enter groundwater and then attempting to remediate the contamination. SVE is a proven technology which can remove VOCs and prevent them from migrating into the groundwater.

In summary, it is the Agency's opinion that the selected remedy is the best overall choice for remediation of both soil and groundwater at the Medley Farms Site. The natural flushing alternative is not acceptable because:

- o the underestimation of the time necessary for cleanup will apply to the groundwater pump-and-treat undertaken at the end of the natural flushing period, which is required to capture residual contaminants entering groundwater late in the 20-year natural flushing period
- o the cost savings may not be substantial and do not justify reliance on natural flushing
- o technical publications strongly recommend addressing residual source areas using a companion technology along with pump-and-treat (such as SVE)
- o the Agency believes it to be more logical to eliminate the residual source areas, since they are a potential problem which would likely affect the pump-and-treat system, by using SVE to remediate those areas.

Please address any questions or comments to the undersigned, or to Ralph Howard, the Remedial Project Manager who will be taking over guidance of the site following finalization of the Record of Decision.

Sincerely,



Jon K. Bornholm
Remedial Project Manager

APPENDIX B

SCOPE OF WORK FOR THE REMEDIAL DESIGN AND REMEDIAL ACTION AT THE MEDLEY FARM SITE

INTRODUCTION

The purpose of this Remedial Design/Remedial Action (RD/RA) is to design, construct, operate and maintain, monitor, and complete the selected remedy to ensure protection of human health and the environment. Remedial Design (RD) is generally defined as those activities to be undertaken by the Settling Defendants to develop the final plans and specifications, general provisions and special requirements necessary to translate the Record of Decision (ROD) into the remedy to be constructed under the Remedial Action (RA) phase. RA is generally the implementation phase of site remediation or actual construction of the remedy and performance monitoring. The RA is based on the RD to achieve the Performance Standards as defined in the Consent Decree. This Scope of Work (SOW) is designed to provide a framework for conducting the RD/RA activities at this Site and is the "technical" portion of this Consent Decree. This SOW provides for a number of detailed documents which shall be used to guide each component of the RD/RA process at this Site.

The Settling Defendants shall conduct an RD/RA that is in accordance with this SOW and consistent with the Record of Decision (ROD) issued on May 29, 1991, the Superfund Remedial Design and Remedial Action Guidance (U.S. EPA Office of Solid Waste and Emergency Response Directive 9355.0-4A, June 1986) (the "RD/RA Guidance"), and other guidances used by EPA in conducting an RD/RA (a list of the primary guidances is attached), as well as any additional requirements in this Consent Decree. The Settling Defendants shall furnish all necessary personnel, materials, and services needed, or incidental to, performing and completing the RD/RA, including necessary operation and maintenance, and performance monitoring.

EPA shall provide oversight of the Settling Defendants' activities throughout the RD/RA. The Settling Defendants shall support EPA's initiation and conduct of activities related to the implementation of oversight activities. However, Settling Defendants shall be responsible for conducting an adequate RD/RA to satisfactorily implement the selected remedy. EPA review and approval of deliverables is a tool to assist this process and to satisfy, in part, EPA's responsibility to provide effective protection of public health, welfare, and the environment. EPA approval of a task or deliverable shall not be construed as a guarantee as to the ultimate adequacy of such

task or deliverable. A summary of the major deliverables that Settling Defendants shall submit for the RD/RA is attached.

OVERVIEW OF THE REMEDY

THE REMEDIAL OBJECTIVES OF THIS REMEDY ARE TO:

1. Prevent or mitigate the continued release of hazardous substances to groundwater.
2. Eliminate or minimize the potential threats posed to public health and the environment from current and potential migration of hazardous substances in the groundwater and subsurface soil at and from the Site.
3. Reduce concentrations of hazardous substances, in groundwater and subsurface soil to remediation levels, established as Performance Standards, consistent with the ROD and the SOW.
4. Reduce the volume, toxicity and mobility of hazardous substances at the Site.
5. Maintain air quality at protective levels for on-site workers and the public during remediation as specified in the ROD.

REMEDY COMPONENTS:

A. Monitoring

1. Monitoring of Existing Conditions

The Settling Defendants shall monitor, beginning within 30 days of the lodging of the Consent Decree and continuing on a quarterly basis, the groundwater and surface water sampling points specified below.

(a) Wells SW-1, BW-1, BW-4, SW-101, SW-106, BW-106, SW-108 and BW-108 will be sampled and analyzed on a quarterly basis for the same range of volatile organic compounds ("VOCs") sampled and analyzed as part of the RI. This quarterly sampling program shall continue until such time as the overall Site monitoring program, to be developed during the Remedial Design phase, becomes effective.

(b) Wells SW-3, SW-4, BW-2 and BW-105 will be sampled and analyzed on a quarterly basis for the same range of VOCs and semi-volatile organic compounds ("SVOCs") sampled and analyzed as part of the RI. If the first set of analyses for SVOCs only verifies the findings of the RI, then such sampling of SVOCs only may be discontinued.

(c) Surface water and sediments from the two tributaries to Jones Creek shall be sampled for VOCs at the following locations: (i) at a position northeast of the Site in the vicinity and downgradient of monitoring well cluster SW-108/BW-108, and (ii) at a position south of the Site in the vicinity and downgradient of monitoring well cluster WS-106/BW-106. In the event that VOCs are identified at either of these sampling locations, then either or both of these sampling points will be added to the overall monitoring program to be developed for the Site during the Remedial Design phase. If VOCs are not identified at these locations, then further sampling may be discontinued.

All monitoring under this provision shall be conducted in accordance with the Remedial Investigation/Feasibility Study Quality Assurance Project Plan for this Site.

2. Remedy Monitoring

Groundwater, surface water and subsurface soil monitoring shall be performed as required by the Consent Decree, the ROD and the SOW as specified in Paragraph B (Source Control) and Paragraph C (Groundwater Remediation) below. Monitoring will be conducted in accordance with the Performance Standard Verification Plan developed pursuant to Task V of this SOW.

B. Source Control

Source control will address the remediation of contaminated soil at the Site by employing a Soil Vapor Extraction ("SVE") system. The source control approach to be implemented at the Site involves the in-situ treatment of contaminated soils to prevent or minimize the leaching of contaminants from unsaturated soils to groundwater. Figure 23 of the ROD identifies the three areas on the Site where SVE will be installed. The precise location and depth of the SVE system will be established during the Remedial Design phase.

1. Treatment Technology

Contaminated soil will be treated using an SVE system as selected in the ROD. The SVE system uses an in-situ treatment process to clean-up soils that contain VOCs by inducing a vacuum in the subsurface soils. The vacuum causes in-situ volatilization of compounds. Vaporized compounds then migrate to air extraction wells for removal prior to emission of the treated air to the atmosphere. The system typically consists of the following units:

- i. air withdrawal or vacuum wells
- ii. pump-and-manifold system
- iii. in-line water removal system

- iv. a system to treat off-gases (a carbon absorption system is specified in the ROD).

2. Performance Standards

The Settling Defendants shall meet all Performance Standards, as that term is defined in the Consent Decree, including, but not limited to, the following:

- i. Settling Defendants shall treat all contaminated soils to achieve the soil remediation levels specified in Table 1 (Soil Remediation Levels) which is attached hereto and incorporated herein.

- ii. Settling Defendants will at all times, while implementing source control measures, comply with all applicable or relevant and appropriate requirements ("ARARs").

- iii. The operational standards for source control measures shall be set forth in the Operation and Maintenance Plan and shall begin on the date on which the Remedial Action Report is approved by EPA and shall continue until the Remedial Objectives and the Site Objectives are achieved in accordance with the Consent Decree, the ROD and the SOW.

- iv. SVE shall continue until contaminated soil achieves the soil remediation levels.

- v. Testing methods approved by EPA shall be used to determine if the soil remediation levels have been achieved.

- vi. Monitoring requirements for SVE shall be determined in the Remedial Design phase, and shall be set forth in the Remedial Design Work Plan.

3. Compliance Testing

Settling Defendants shall perform compliance testing to determine if all performance standards have been met. The treated soils will be tested in accordance with the Performance Standards Verification Plan developed pursuant to Task V of this SOW.

4. Treatability Studies

Settling Defendants shall perform Treatability Studies, if such studies are determined by EPA to be necessary, in accordance with Task II, Paragraph A.4 to verify that the SVE system as designed will attain all Performance Standards. The study results and operating conditions shall be used in the detailed design of the SVE. The results of the Treatability Study shall be evaluated by EPA to verify that the proposed

treatment will attain the Performance Standards in the Consent Decree, the ROD and the SOW. Treatability Study Evaluation Report(s) shall be submitted to EPA in the format of technical memoranda, in accordance with all applicable requirements of the Consent Decree and the SOW.

C. Groundwater Remediation

Groundwater remediation will address the contaminated groundwater at the Site. Groundwater remediation will include the extraction of contaminated groundwater, treatment and discharge to Jones Creek, and an overall monitoring program for the Site.

1. Treatment Technology

Extraction and treatment of groundwater will be accomplished by a groundwater extraction and air stripping systems. The groundwater extraction system will consist of a series of extraction wells located within the periphery of the contaminant plume, in the saprolite and bedrock portions of the aquifer. Well design and implementation requirements will be determined during the Remedial Design Phase. Extracted groundwater will be pumped from the extraction wells, transferred by piping, and fed into the air stripping system. The air stripping system, as designed, will be capable of removing VOCs from the groundwater. Settling Defendants shall evaluate the off-gases from the air stripping system to determine if treatment of such gasses is necessary. Treated water shall be discharged to Jones Creek consistent with the effluent limitations, terms and conditions of a duly-issued National Pollutant Discharge Elimination System (NPDES) permit. The groundwater extraction and treatment system typically consists of the following units:

- i. groundwater extraction system
- ii. piping delivery system
- iii. air stripping tower and related support equipment
- iv. treatment system for water discharge to surface water bodies.

IF EPA determines in its sole discretion that an NPDES permit for discharge of the extracted groundwater to Jones Creek cannot be obtained, the Settling Defendants may consider and propose to EPA other discharge alternatives, including infiltration.

2. Performance Standards

The Settling Defendants shall meet all Performance Standards, as that term is defined in the Consent Decree, including, but not limited to, the following (except as

provided for in Section E (Contingency Measures):

i. Groundwater shall meet the remediation levels specified in Table 2 (Groundwater Remediation Levels), which is attached hereto and incorporated herein, at the wells designated as compliance points in the Performance Standards Verification Plan developed pursuant to Task V of this SOW.

ii. Except as provided for in Section E (Contingency Measures) hereof, Settling Defendants will at all times, while implementing groundwater remediation measures, comply with all ARARs.

iii. The operational standards for groundwater remediation measures shall be set forth in the Operation and Maintenance Plan and shall begin on the date on which the Remedial Action Report is approved by EPA and shall continue until the Remedial Objectives and the Site Objectives are achieved in accordance with the Consent Decree, the ROD and the SOW.

iv. Groundwater discharges, if any, from the groundwater treatment system into Jones Creek shall comply with the effluent limitations, terms and conditions of a duly-issued NPDES permit.

v. The Settling Defendants shall operate the groundwater extraction and treatment system until the remediation levels set forth in Table 2 are met, and until Settling Defendants have demonstrated compliance with the Performance Standards, as provided in the Performance Standards Verification Plan (except as provided for in Section E (Contingency Measures)).

vi. Testing methods approved by EPA shall be used to determine if the groundwater remediation levels have been achieved.

vii. Monitoring requirements for groundwater remediation shall be determined in the Remedial Design phase, and shall be set forth in the Remedial Design Work Plan.

3. Compliance Testing

Settling Defendants shall perform compliance testing to verify that all Performance Standards are met. Groundwater will be tested in accordance with the Performance Standards Verification Plan developed pursuant to Task V of this SOW.

4. Treatability Studies

Settling Defendants shall perform Treatability Studies in accordance with Task I, Paragraph D of this SOW. The results of the above-referenced Treatability Studies shall be evaluated by EPA to verify that the proposed treatment will attain the Performance Standards in the Consent Decree, the ROD and the SOW. The Treatability Studies Evaluation Report(s) shall be submitted to EPA in the format of technical memoranda, in accordance with all applicable requirements of the Consent Decree and the SOW.

D. Operation and Maintenance

Settling Defendants shall operate and maintain the selected remedy in accordance with the Operation and Maintenance Plan developed pursuant to Task V of this SOW.

E. Contingency Measures

If, with respect to the groundwater extraction and treatment system, EPA determines (on its own accord or after petition from Settling Defendants as provided below) after reasonable opportunity for review and comment by the State, that data from quarterly sampling at individual monitoring wells demonstrates that concentrations of one or more contaminants remain at asymptotic values above the remediation levels specified in Table 2 attached hereto for a period of at least two years, notwithstanding compliance with the terms of the Consent Decree and this SOW and Technical Maximization Measures (as defined below) by Settling Defendants, the Settling Defendants may petition EPA to waive or modify one or more of the remediation levels specified in Table 2 based upon a demonstration, in accordance with the provisions of Section 121(d)(4)(C) of CERCLA, 42 U.S.C. § 9621(d)(4)(C), that such remediation level(s) is "technically impracticable from an engineering perspective."

"Technical Maximization Measures" shall mean, following implementation of the Remedial Action in compliance with terms of the Consent Decree and the SOW and subject to EPA approval, implementation of measures to maximize the performance of the Remedial Action to attain and meet continuously for at least five consecutive quarters the Performance Standards, including, but not limited to modifying the pump and treat system by (a) alternating pumping at wells to eliminate stagnation points, (b) pulse pumping to allow aquifer equilibration and to allow absorbed contaminants to partition into groundwater, and (c) installing additional extraction wells to facilitate or accelerate cleanup of the contaminant plume. Prior to implementing any Technical Maximization Measures, Settling Defendants may petition EPA to modify such measures.

Notwithstanding any terms of this Paragraph E (Contingency Measures), Settling Defendants will proceed with all long-term monitoring activities as otherwise required in this SOW.

Any petition by the Settling Defendants to EPA to request a determination of technical impracticability and a waiver or modification of the remediation levels, shall include at a minimum the following:

1. an identification of each Performance Standard for which a waiver or modification is sought;
2. a justification setting forth the technical basis for the claim that it is technically impracticable from an engineering perspective to attain and meet continuously for at least five consecutive quarters each such Performance Standard at the Site, with such justification demonstrating, using data from quarterly sampling at individual monitoring wells for a period of at least two years, that concentrations of indicator chemicals remain at asymptotic values above Performance Standards;
3. a description of all "Technical Maximization Measures" employed to attain and meet continuously for at least five consecutive quarters the Performance Standards;
4. an evaluation of any additional response actions that might be taken by the Settling Defendants to reduce the concentrations of contaminants identified in Table 2 attached hereto to the lowest concentrations that are technically practicable from an engineering perspective;
5. a proposed new or revised performance standard, hereinafter referred to as an "Alternative Performance Standard," which shall reflect the lowest concentration of such contaminant identified in Table 2 attached hereto that is technically practicable from an engineering perspective to attain at the Site; and
6. a demonstration that the groundwater portion of the Remedial Action at the Site, together with any additional response actions proposed by the Settling Defendants in its petition, will meet the Alternative Performance Standards and will attain a degree of cleanup of the contaminants identified in Table 2 attached hereto and of control of further releases which will assure protection of human health and the environment.

Based on a review of the petition and any supporting information submitted by the Settling Defendants, EPA, in its

sole discretion, shall determine whether the Settling Defendants are to make any modification to the groundwater portion of the Remedial Action or implement any additional response actions relating to groundwater contamination, and whether to waive compliance with or modify any Performance Standards for groundwater. If EPA grants any petition or other relief pursuant to this section, the Settling Defendants shall thereafter implement those modifications to the groundwater portion of the Remedial Action or additional response actions relating to groundwater contamination, and achieve and maintain all new or revised Alternative Performance Standards established pursuant to this section and such Alternative Performance Standards shall be incorporated into the term "Performance Standards" as defined in the Consent Decree for all purposes for which such term is used in the Consent Decree and in this SOW.

EPA's decisions and findings with respect to any petition under this Section are subject to the dispute resolution provisions of the Consent Decree.

TASK I - SCOPING AND INITIAL DATA COLLECTION ACTIVITIES

Scoping is the initial planning process of the RD/RA and has been initiated by EPA through this document to determine how the site-specific Performance Standards will be met. The specific project scope shall be planned by the Settling Defendants and EPA. The Settling Defendants shall document the specific project scope in an RD Work Plan and an RA Work Plan. Additional data requirements may be identified throughout the RD/RA process. The Settling Defendants shall submit a technical memorandum documenting any need for additional data along with the proposed Data Quality Objectives ("DQOs") whenever such requirements are identified. In any event, the Settling Defendants are responsible for fulfilling additional data and analysis needs identified by EPA consistent with the general scope and objectives of the Consent Decree, including this SOW.

The Site Objectives for the Medley Farm Site have been determined preliminarily, based on available information, to be the following:

1. Review of existing information pertaining to the Site. This includes the ROD, the Remedial Investigation/Feasibility Study (RI/FS), and other reports or related information.
2. Review of relevant guidance (see attached list of references) to understand the RD/RA process. This information shall be used in performing the RD/RA and preparing all deliverables under this SOW.

3. Collection of additional data, as required. This may include additional sampling, geotechnical investigations, surveys, modeling, or other needed Site activities. In particular, additional investigation must be conducted to address the following data gaps in the RI/FS:

- determine the full extent (vertical and horizontal) of the groundwater contaminant plume in the NE direction; and

- determine if the two tributaries feeding the Jones Creek have been impacted. This effort shall include establishing at least one sampling point on each tributary for collecting surface water and sediment samples for VOC analysis.

4. Performance of bench and/or pilot Treatability Studies, as needed, to evaluate and properly design the selected remedy.

5. Preparation of detailed design plans and specifications necessary to construct the selected remedy.

6. Actual implementation of the selected remedy, including construction of facilities necessary to implement the selected remedy.

7. Operation and maintenance of the facilities necessary to implement the selected remedy, as required.

8. Verifying that all Site Performance Standards are met.

9. Completion of the selected remedy to protect human health and the environment.

The Settling Defendants shall meet or confer with EPA to discuss all project planning decisions and special concerns associated with the Site. The following activities shall be performed by the Settling Defendants as a function of the project scoping process.

A. Site Background

The Settling Defendants shall gather and analyze the existing information regarding the Site and conduct a visit to the Site, if necessary, to assist in planning the scope of the RD/RA as follows:

1. Collect and Analyze Existing Data and Document the Need for Any Additional Data

Before planning RD/RA activities, all existing Site data shall be thoroughly compiled and reviewed by the Settling Defendants. Specifically, this shall include the ROD, RI/FS, and other available data related to the Site. This information shall be utilized in determining if any additional data is needed for RD/RA implementation. Decisions on the necessary data and Data Quality Objectives (DQOs) shall be made by EPA.

2. Conduct Site Visit

The Settling Defendants may conduct a visit to the Site with the EPA Remedial Project Manager (RPM) during the project scoping phase to assist in developing a conceptual understanding of the RD/RA requirements for the Site. Information gathered during this visit would be utilized to better scope the project and to determine the extent of additional data necessary to implement the RD/RA.

B. Project Planning

The Settling Defendants shall meet or confer with EPA regarding the following activities and before proceeding with Task II:

1. Refine the Site Objectives

Whenever necessary, the Settling Defendants shall refine the Site Objectives. Any revised Site Objectives shall be documented in a technical memorandum to be prepared by Settling Defendants and are subject to EPA approval prior to proceeding with Task II.

2. Document the Need for Treatability Studies

Treatability Studies shall be conducted by the Settling Defendants if determined by EPA in its sole discretion to be necessary, to evaluate whether the selected remedy will comply with all applicable or relevant and appropriate requirements (ARARs), attain all Performance Standards, as well as any other treatment requirements outlined in the ROD. Treatability Studies shall be required except where the Settling Defendants can demonstrate to EPA's satisfaction that they are not needed. The study results and operating conditions shall be used in the detailed design of the selected remedy. Where Treatability Studies are needed, Treatability Study activities shall be planned to occur concurrently with additional data collection activities (see Task II).

3. Evaluate Treatability Studies

Where Treatability Studies are required, the Settling Defendants shall propose and EPA shall approve the type of Treatability Studies. The decision to conduct Treatability

Studies shall be made as early in the Remedial Design phase as possible to minimize potential delays.

C. Field Sampling and Analysis

Settling Defendants shall prepare a Field Sampling and Analysis Plan ("FSAP") to address initial sampling activities at the Site. Upon approval of the FSAP by EPA, Settling Defendants shall implement the FSAP. The existing Site Quality Assurance Project Plan ("QAPP") produced during the Remedial Investigation/Feasibility Study for the Site shall be used for these activities and the document will be modified, as necessary, to address the Site specific features of the work.

The specific activities of the FSAP include:

1. Conduct water quality testing of the Site groundwater to determine if additional treatment of the groundwater is needed to address possible concerns for corrosion, scaling, precipitant formation, or other possible contingencies associated with groundwater treatment.

2. Conduct additional analytical testing of the groundwater to identify possible inorganic constituents that may require additional treatment technologies to address anticipated NPDES permit requirements.

3. Determine the full extent (vertical and horizontal) of the groundwater contaminant plume in the northeast direction.

D. Treatability Studies

Treatability Studies are anticipated to better define and evaluate possible technical issues such as metals precipitation, suspended solids removal, corrosion, and scaling. These studies are expected to be bench-scale studies developed to augment the activities of the remedial design. In the event these studies are determined by EPA to be necessary, the Settling Defendants shall develop and submit a Treatability Study Work Plan for review and approval by EPA. A schedule for performing the Treatability Studies shall be included with specific dates for the tasks, including, but not limited to, the procurement of contractors and the completion of sample collection, performance, sample analysis and report preparation. The results of these studies shall be transmitted to EPA in a Treatability Study Evaluation Report(s), in the form of one or more technical memoranda at the conclusion of each particular activity(ies). Based upon the findings of the FSAP activities, studies such as the following may be conducted:

1. A series of jar tests to identify optimized physical and chemical conditions under which metals-removal treatment of the extracted groundwater may best be conducted.

2. Filtration testing to identify the particle size distribution of suspended particulates in the extracted groundwater. These data would then be utilized to specify the necessary filtration equipment and appurtenances.

3. The water chemistry of the extracted groundwater would be evaluated to determine the likelihood of corrosion and scaling occurring during the Remedial Action phase. This evaluation would lead to modifications during the Remedial Design phase to account for these possible concerns.

E. Health and Safety Plan

A Site-specific Health and Safety Plan shall be prepared in conformance with the Settling Defendant's health and safety program, and in compliance with applicable OSHA regulations and protocols. The Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and Site controls. The Health and Safety Plan shall be prepared in a manner such that it can be effectively utilized throughout the RD/RA process, including any Treatability Study phase of the Remedial Design. It is understood that EPA does not "approve/disapprove" of the Settling Defendants' Health and Safety Plan. EPA's role is to review the plan to verify that all necessary elements are included and that the plan adequately addresses the protection of human health and the environment.

TASK II - REMEDIAL DESIGN

Remedial Design shall be performed to support the response actions selected in the ROD. The Remedial Design shall provide the technical details for implementation of the Remedial Action in accordance with standard professional engineering and construction practices. The design shall include clear and comprehensive design plans and specifications.

A. Remedial Design Planning

At the conclusion of the project planning phase, the Settling Defendants shall submit the RD Work Plan, including the Sampling and Analysis Plan. The RD Work Plan shall include and address results obtained during the field activities described in Task I.

The RD Work Plan must be reviewed and approved by EPA prior to the initiation of field activities contemplated in the RD Work

Plan.

Upon approval of the RD Work Plan, the Settling Defendants shall implement the RD Work Plan in accordance with the EPA-approved design management schedule contained therein. Such implementation shall include EPA review and/or approval of plans, specifications, submittals, and other deliverables. The purpose of these design reviews is for EPA to assess the feasibility of the design to achieve the Site Objectives in accordance with the ROD and Consent Decree, including this SOW. Review and/or approval of design submittals only allows the Settling Defendants to proceed to the next step of the design process. It does not imply acceptance of later design submittals that have not been reviewed, nor that the remedy, when constructed, will meet performance standards and be accepted.

1. RD Work Plan

A Work Plan documenting the decisions and evaluations completed during the scoping process shall be submitted to EPA for review and approval. The Work Plan shall include a comprehensive description of the additional data collection and evaluation activities to be performed and the plans and specifications to be prepared. A comprehensive design management schedule for completion of each major activity and submission of each deliverable shall also be included. The Work Plan shall be developed in conjunction with the Health and Safety Plan and the Sampling and Analysis Plan, although each plan may be delivered under separate cover.

Specifically, the Work Plan shall present the following:

a. A statement of the problem(s) and potential problem(s) posed by the Site and how the objectives of the RD/RA will address the problem(s).

b. A background summary setting forth the following:

1) A brief description of the Site including the geographic location, and a description of the physiographic, hydrologic, geologic, demographic, ecological, cultural and natural resource features of the Site;

2) A brief synopsis of the history of the Site including a summary of past disposal practices and a description of previous response actions that have been conducted by local, State, Federal, or private parties at the Site;

3) A summary of the existing data in terms of

physical and chemical characteristics of the contaminants identified and their distribution among the environmental media at the Site.

c. A brief list and detailed description of the tasks to be performed, information needed for each task, information to be produced during and at the conclusion of each task, and a description of the work products that shall be submitted to EPA. This includes the deliverables set forth in the remainder of Task II and Task III A.

d. A schedule with specific dates for completion of each required task and submission of each deliverable required by this Consent Decree, including those in this SOW. This schedule shall also include information regarding timing, initiation and completion of all critical path milestones for each activity and/or deliverable.

e. A project management plan, including a data management plan, monthly reports to EPA, and meetings and presentations to EPA at the conclusion of each major phase of the RD/RA. The data management plan shall address the requirements for project management systems, including tracking, storing, and retrieving the data along with identifying software to be used, minimum data requirements, data format and backup data management. The plan shall address both data management and document control for all activities conducted during the RD/RA.

f. A description of the community relations support activities to be conducted during the RD. At EPA's request, the Settling Defendants will assist EPA in preparing and disseminating information to the public regarding the RD work to be performed.

2. Sampling and Analysis Plan

If any additional sampling is determined by EPA to be necessary after completion of the project planning phase, Settling Defendants shall prepare a Sampling and Analysis Plan (SAP) to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data generated will meet the DQOs established. The SAP shall consist of a FSAP and a QAPP.

The FSAP shall define in detail the sampling and data-gathering methods that shall be used on the project. It shall include sampling objectives, sample location (horizontal and vertical) and frequency, sampling equipment and procedures, and sample handling and analysis. The FSAP shall be written so that a field sampling team unfamiliar with the site would be able to gather the samples and field information required. The QAPP

shall describe the project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that shall be used to achieve the desired DQOs. The DQOs shall, at a minimum, reflect use of analytical methods for identifying contamination and addressing contamination consistent with the levels for remedial action objectives identified in the National Contingency Plan. In addition, the QAPP shall address personnel qualifications, sampling procedures, sample custody, analytical procedures, and data reduction, validation, and reporting. These procedures must be consistent with the Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, February 1, 1991, as it may be amended from time to time. The Settling Defendants shall demonstrate, in advance and to EPA's satisfaction, that each laboratory it may use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved by EPA in the QAPP for the Site. The laboratory must have and follow an approved QA program. The Settling Defendants shall enter into agreements which provide, or include in their contracts with each laboratory, requirements that the laboratories provide EPA with access to laboratory personnel, equipment and records for sample collection, transportation, and analysis. The Settling Defendants shall submit detailed information to demonstrate that each laboratory is qualified to conduct the work, including information on personnel qualifications, equipment and material specifications. In addition, EPA may require submittal of data packages equivalent to those generated in the EPA Contract Laboratory Program (CLP) and may require laboratory analysis of performance samples (blank and/or spike samples) in sufficient number to determine the capabilities of the laboratory. If a laboratory not in the CLP is selected, methods consistent with CLP methods that would be used at this Site for the purposes proposed and QA/QC procedures approved by EPA shall be used. In addition, if the laboratory is not in the CLP program, a laboratory QA program must be submitted for EPA review and approval.

B. Preliminary Design

Preliminary Design begins with initial design and ends with the completion of approximately 30 percent of the design effort. At this stage, the Settling Defendants shall have field verified, as necessary, the existing conditions of the Site. The Preliminary Design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable remedial project. Supporting data and documentation shall be provided with the design documents defining the

functional aspects of the project to prove that the completed project will be effective in meeting the Performance Standards and ARARs. EPA approval of the Preliminary Design is required before proceeding with further design work, unless specifically authorized by EPA, in which case EPA review comments on the Preliminary Design shall be reflected in both the Prefinal and the Final Designs. The Preliminary Design shall include the results of additional data acquisition activities, if required, a Design Criteria Report, preliminary plans and specifications, a Project Delivery Strategy, and a Plan for Satisfying Permitting Requirements. In accordance with the design management schedule established in the approved Remedial Design Work Plan, the Settling Defendants shall submit to EPA the Preliminary Design submittal which shall consist of the following:

1. Results of Data Acquisition Activities

Data gathered during the project planning phase shall be compiled, summarized, and submitted along with an analysis of the impact of the results on design activities. In addition, surveys conducted to establish topography, rights-of-way, easements, and utility lines shall be documented. Utility requirements and acquisition of access, through purchases or easements, that are necessary to implement the RA shall also be discussed.

2. Design Criteria Report

The concepts supporting the technical aspects of the design shall be defined in detail and presented in this report. Specifically, the Design Criteria Report shall include the preliminary design assumptions and parameters, including:

- a. Waste characterization
- b. Pretreatment requirements
- c. Volume of each media requiring treatment
- d. Treatment schemes (including all media and by-products)
- e. Input/output rates
- f. Influent and effluent qualities
- g. Materials and equipment
- h. Performance standards
- i. Long-term performance monitoring requirements

3. Preliminary Plans and Specifications

The Settling Defendants shall submit an outline of the required drawings, including preliminary sketches and layouts, describing conceptual aspects of the design, unit processes, etc. In addition, an outline of the required specifications, including Performance Standards, ARARs, etc., shall be

submitted. The initiation of the construction drawings shall reflect organization and clarity. The scope of the technical specifications shall be outlined in a manner reflecting the final specifications.

4. Plan for Satisfying Permitting Requirements

The final design plans and specifications must be consistent with the technical requirements of all applicable or relevant and appropriate requirements (ARARs) unless a waiver has been issued. Any off-site disposal shall be in compliance with the policies stated in the Procedure for Planning and Implementing Off-site Response Actions (Federal Register, Volume 50, Number 214, November, 1985, pages 45933-45937) and other applicable guidances.

The plan shall identify the off-site disposal/discharge permits that are required, the time required to process the permit applications, and a schedule for submittal of the permit applications.

5. Draft Construction Schedule

The Settling Defendants shall develop a Draft Construction Schedule for construction and implementation of the remedial action which identifies timing for initiation and completion of all critical path tasks. The Settling Defendants shall specifically identify dates for completion of the project and major milestones.

C. Prefinal/Final Design

The Settling Defendants shall submit the Prefinal Design when the work is approximately 90 percent complete in accordance with the approved design management schedule. The Prefinal Design shall have addressed comments generated from the Preliminary Design Review and clearly show any modification of the design as a result of incorporation of the comments. The Prefinal Design shall function as the draft version of the Final Design. After EPA review and comment on the Prefinal Design, the Final Design shall be submitted. All Final Design documents shall be certified by a Professional Engineer registered in the State of South Carolina. EPA approval of the Final Design is required before initiating the RA, unless specifically authorized by EPA. The following items shall be submitted as part of the Prefinal/Final Design:

1. Complete Design Analyses

The selected design shall be presented along with an analysis supporting the design approach. Design calculations shall be included.

2. Complete Plans and Specifications

A complete set of construction drawings and specifications shall be submitted at the Prefinal stage which describe the selected design. The final submittal shall include a complete set of construction drawings and specifications as well as a set of one-half size reductions of the drawings.

3. Final Construction Schedule

4. Construction Cost Estimate

A construction cost estimate based on sound, routine, generally accepted engineering practice shall be submitted.

TASK III - REMEDIAL ACTION

Remedial Action shall be performed in accordance with the terms of the Consent Decree to implement the response actions selected in the ROD. The Remedial Action shall consist of all activities necessary to implement the response actions selected in the ROD prior to operation and maintenance and long-term performance monitoring activities.

A. Remedial Action Planning

Concurrent with the submittal of the Prefinal Design, the Settling Defendants shall submit the following:

- RA Work Plan,
- Construction Management Plan,
- Construction Quality Assurance Plan, and
- Construction Health and Safety Plan/Contingency Plan.

The RA Work Plan, Construction Management Plan, and Construction Quality Assurance Plan must be reviewed and approved and the Construction Health and Safety Plan/Contingency Plan reviewed by EPA prior to the initiation of the Remedial Action.

Upon approval of the RA Work Plan and the Final Design, the Settling Defendants shall implement the RA Work Plan in accordance with the construction management schedule. Significant "field" changes to the RA as set forth in the RA Work Plan and Final Design shall not be undertaken without the approval of EPA. The RA shall be documented in enough detail to produce "as-built" construction drawings certified by a Professional Engineer registered in the State of South Carolina after the RA is complete. Implementation of the RA shall include EPA review and/or approval of required deliverables. The purpose of these reviews is for EPA to assess the

feasibility of the project to achieve the Site Objectives in accordance with the ROD and Consent Decree, including this SOW. Review and/or approval of submittals does not imply acceptance of later submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards and be accepted.

1. RA Work Plan

A Work Plan which provides a detailed plan of action for completing the RA activities shall be submitted to EPA for review and approval. The objective of this work plan is to provide for the safe and efficient completion of the RA. The Work Plan shall include a comprehensive description of the work to be performed and a construction management schedule for completion of each major activity and submission of each deliverable. The Work Plan shall be developed in conjunction with the Construction Management Plan, the Construction Quality Assurance Plan, and the Construction Health and Safety Plan/Contingency Plan, although each plan may be delivered under separate cover.

Specifically, the Work Plan shall present the following:

- a. A detailed description of the tasks to be performed and a description of the work products to be submitted to EPA. This includes the deliverables set forth in the remainder of Task III.
- b. A schedule for completion of each required activity and submission of each deliverable required by this Consent Decree, including those in this SOW.
- c. A project management plan, including monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the RA.
- d. A description of the community relations support activities to be conducted during the RA. At EPA's request, the Settling Defendants will assist EPA in preparing and disseminating information to the public regarding the RA work to be performed.
- e. A description of Settling Defendants' strategy for conducting the project. This description shall focus on the management approach to carry out the design and implement the Remedial Action. Items to be addressed include procurement method and contracting strategy, phasing alternatives, and contractor and equipment availability concerns. If the construction of the selected remedy is to be accomplished by Settling Defendants' "in-house" resources, these resources shall be identified.

2. Construction Management Plan

A Construction Management Plan shall be developed to indicate how the construction activities are to be implemented and coordinated with EPA during the RA. The Settling Defendants shall designate a person to be a Remedial Action Coordinator and their representative on-site during the Remedial Action. This plan shall identify this representative along with other key project management personnel and lines of authority as well as provide descriptions of the duties of the key personnel along with an organizational chart. In addition, a plan for the administration of construction changes and EPA review and approval of those changes shall be included.

3. Construction Quality Assurance Project Plan

Settling Defendants shall develop and implement a Construction Quality Assurance Program to ensure, with a reasonable degree of certainty, that the completed remedial action meets or exceeds all design criteria, plans and specifications, and Site Objectives. The Construction Quality Assurance Plan shall incorporate relevant areas of the Performance Standards Verification Plan (see Task V). At a minimum, the Construction QA plan shall include the following elements:

a. A description of the quality control organization, including a chart showing lines of authority, identification of the members of the Independent Quality Assurance Team (IQAT), and acknowledgment that the IQAT will implement the control system for all aspects of the work specified and shall report to the project coordinator and EPA. The IQAT members shall be representatives from testing and inspection organizations and the Supervising Contractor and shall be responsible for the QA/QC of the RA. The members of the IQAT shall have a good professional and ethical reputation, previous experience in the type of QA/QC activities to be implemented, and demonstrated capability to perform the required activities. They shall also be independent of the construction contractor.

b. The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function.

c. Documentation of the observations and control testing that will be used to monitor the construction and/or installation of the components of the remedial action. This includes information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used complies with applicable standards. Any laboratories to be used shall be specified. Acceptance/Rejection criteria and plans for implementing corrective measures shall be addressed.

d. A schedule for managing submittals, testing, inspections, and any other QA function (including those of contractors, subcontractors, fabricators, suppliers, purchasing agents, etc.) that involves assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall also verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records, etc.

e. Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.

f. A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements.

4. Construction Health and Safety Plan/Contingency Plan

A Construction Health and Safety Plan/Contingency Plan shall be prepared in conformance with the Settling Defendants' health and safety program, and in compliance with OSHA regulations and protocols. The Construction Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. Note that EPA does not "approve" the Settling Defendants' Construction Health and Safety Plan/Contingency Plan, but rather EPA reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment. This plan shall include a Contingency Plan and incorporate Air Monitoring and Spill Control and Countermeasures Plans, if applicable for the site. Air monitoring will be necessary at any site when the site specific risk assessment specifies a risk via the inhalation/air transport pathway. The Contingency Plan is to be written for the on-site construction workers and the local affected population. It shall include the following items:

a. Name of Person who will be responsible in the event of an emergency incident.

b. Plan for initial safety indoctrination and training for all employees, name of the person who will give the training and the topics to be covered.

c. Plan and date for meeting with the local community, including Local, State and Federal agencies involved in the

remediation, as well as the local emergency squads and the local hospitals.

d. A list of the first aid and medical facilities including: location of first aid kits, names of personnel trained in first aid, a clearly marked map with the route to the nearest medical facility, all necessary emergency phone numbers conspicuously posted at the job site (i.e., fire, rescue, local hazardous material teams, National Emergency Response Team, etc.)

e. Plans for protection of public and visitors to the job site.

f. Air Monitoring Plan which addresses the following factors:

1) Air monitoring shall be conducted both on site and at the perimeter of the site. The chemical constituents that were identified at the site as part of the Risk Assessment shall serve as a basis of the sampling for and measurement of pollutants in the atmosphere.

2) Air monitoring shall include personnel monitoring, on-site area monitoring, and perimeter monitoring.

a) Personnel Monitoring shall be conducted according to OSHA and NIOSH regulations and guidance.

b) On-site Area Monitoring shall consist of continuous real-time monitoring performed immediately adjacent to any waste excavation areas, treatment areas, and any other applicable areas when work is occurring. Measurements shall be taken in the breathing zones of personnel and immediately upwind and downwind to the work areas. Equipment may, as deemed appropriate, include the following: Organic Vapor Meter, Explosion Meter, Particulate Monitoring Equipment, and On-site Windssock.

c) Perimeter Monitoring shall consist of monitoring airborne contaminants at the perimeter of the site to determine whether harmful concentrations of toxic constituents are migrating off-site. EPA approved methods shall be used for sampling and analysis of air at the site perimeter. Perimeter samples shall be sampled and analyzed for the constituents of concern identified in the risk assessment. The results of the perimeter air monitoring and the on-site meteorological station shall be used to assess the potential for off-site population exposure to toxic materials. The air monitoring program shall include provisions for notifying nearby residents, Local, State and Federal agencies in the event that an emission of concentrations of airborne toxic constituents, which are

measured at consistently above-background levels, is migrating off-site.

g. A Spill Control and Countermeasures Plan which shall include the following:

1) Contingency measures for potential spills and discharges from materials handling and/or transportation.

2) A description of the methods, means, and facilities required to prevent contamination of soil, water, atmosphere, uncontaminated structures, equipment, or material by the discharge of wastes from spills due to operations.

3) A description of the equipment and personnel necessary to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. This collected spill material must be properly disposed of.

4) A description of the equipment and personnel to perform decontamination measures that may be required to remove spillage from previously uncontaminated structures, equipment, or material.

B. Preconstruction Conference

A Preconstruction Conference shall be held after selection of the construction contractor but before initiation of construction. This conference shall include the Settling Defendants and Federal, State and Local government agencies and shall:

1. Define the roles, relationships, and responsibilities of all parties;

2. Review methods for documenting and reporting inspection data;

3. Review methods for distributing and storing documents and reports;

4. Review work area security and safety protocols;

5. Review the Construction Schedule.

6. Conduct a site reconnaissance to verify that the design criteria and the plans and specifications are understood and to review material and equipment storage locations.

The Preconstruction Conference must be documented, including names of people in attendance, issues discussed, clarifications

made, special instructions issued, etc.

C. Prefinal Inspection

Upon preliminary project completion the Settling Defendants shall notify EPA for the purpose of conducting a Prefinal Inspection. Participants shall include the Project Coordinators, Supervising Contractor, Construction Contractor, and other Federal, State, and local agencies with a jurisdictional interest. The Prefinal Inspection shall consist of a walk through inspection of the entire project site. The objective of the inspection is to determine whether the project is complete and consistent with the Consent Decree. Any outstanding construction items discovered during the inspection shall be identified and noted on a punch list. Additionally, treatment equipment shall be operationally tested by the Settling Defendants. The Settling Defendants shall certify that the equipment has performed to effectively meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. A Prefinal Inspection Report shall be submitted which outlines the outstanding construction items, actions required to resolve the items, completion date for the items, and an anticipated date for the Final Inspection.

D. Final Inspection

Upon completion of all outstanding construction items, the Settling Defendants shall notify EPA for the purposes of conducting a Final Inspection. The Final Inspection shall consist of a walk-through inspection of the entire project site. The Prefinal Inspection Report shall be used as a check list with the Final Inspection focusing on the outstanding construction items identified in the Prefinal Inspection. All tests that were originally unsatisfactory shall be conducted again. Confirmation shall be made during the Final Inspection that all outstanding items have been resolved. Any outstanding construction items discovered during the inspection still requiring correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Inspection requiring another Prefinal Inspection Report and subsequent Final Inspection.

E. Remedial Action Report

Within thirty days after the Final Inspection, the Settling Defendants shall prepare and submit a Remedial Action Report which certifies that all items contained in the Consent Decree, including the ROD and this SOW and all incorporated documents (i.e., work plans, reports, plans and specifications, etc.) have been completed and that the remedy is functional and operating and has met the design plans and specifications.

Such report shall be certified by a Professional Engineer registered in the State of South Carolina. The RA Report shall include the following items:

1. Brief description of how outstanding items noted in the Prefinal Inspection were resolved;
2. Synopsis of the work defined in the SOW and certification that this work was performed;
3. Explanation of modifications made during the RA to the original RD and RA Work Plans and why these changes were made;
4. As-built and Record Drawings; and,
5. Documentation of how the Respondents are implementing the EPA-approved Operation and Maintenance Plan and Performance Standards Verification Plan.

After EPA review, Settling Defendants shall address any comments and, if determined by EPA to be necessary, submit a revised report. The Remedial Action shall not be considered complete until EPA approves the RA Report.

TASK IV - OPERATION AND MAINTENANCE

Operation and Maintenance (O&M) shall be performed for projects that produce facilities requiring operation and maintenance to support the response actions selected in the ROD. Operation and Maintenance shall be considered to begin on the date of the RA Report and shall be conducted until the Remedial Objectives and the Site Objectives are achieved in accordance with the ROD, this SOW, and Consent Decree.

A. Operation and Maintenance Plan

Concurrent with the submittal of the Prefinal (90 percent) Design, the Settling Defendants shall submit an Operation and Maintenance Plan for review. The Operation and Maintenance Plan shall be revised during the Remedial Action after identification of the specific equipment to be installed by the construction contractor and submitted for review by EPA prior to 50 percent completion of the Remedial Action and initiation of Operation and Maintenance activities.

Upon approval of the Operation and Maintenance Plan, the Settling Defendants shall implement the Operation and Maintenance Plan in accordance with the schedule contained therein. This plan shall describe start-up procedures, operation, troubleshooting, training, and evaluation activities

that shall be carried out by the Settling Defendants. This plan shall also include all necessary O&M information for the operating personnel for the anticipated life of the project. The plan shall address the following elements:

1. Equipment start-up and operator training;
 - a. Technical specifications governing treatment systems;
 - b. Requirements for providing appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the systems; and,
 - c. Schedule for training personnel on appropriate operational procedures once start-up has been successfully completed.
2. Description of normal operation and maintenance;
 - a. Description of tasks required for system operation;
 - b. Description of tasks required for system maintenance;
 - c. Description of prescribed treatment or operating conditions; and,
 - d. Schedule showing the required frequency for each O&M task.
3. Description of potential operating problems;
 - a. Description and analysis of potential operating problems;
 - b. Sources of information regarding problems; and,
 - c. Common remedies or anticipated corrective actions.
4. Description of routine monitoring and laboratory testing;
 - a. Description of monitoring tasks;
 - b. Description of required laboratory tests and their interpretation;
 - c. Required QA/QC; and,

- d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.
- 5. Description of alternate O&M;
 - a. Should systems fail, alternate procedures to prevent undue hazard, and
 - b. Analysis of vulnerability and additional resource requirements should a failure occur.
- 6. Safety Plan;
 - a. Description of precautions to be taken and required health and safety equipment, etc., for site personnel protection, and
 - b. Safety tasks required in the event of systems failure.
- 7. Description of equipment;
 - a. Equipment identification;
 - b. Installation of monitoring components;
 - c. Maintenance of site equipment; and,
 - d. Replacement schedule for equipment and installation components.
- 8. Records and reporting mechanisms required;
 - a. Daily operating logs;
 - b. Laboratory records;
 - c. Records of operating cost;
 - d. Mechanism for reporting emergencies;
 - e. Personnel and Maintenance Records; and,
 - f. Monthly reports to State/Federal Agencies.

TASK V - PERFORMANCE MONITORING

Performance monitoring shall be conducted to ensure that the Remedial Objectives and the Site Objectives for the remedy are met.

A. Performance Standards Verification Plan

The purpose of the Performance Standards Verification Plan is to provide a mechanism to verify that both short-term and long-term Performance Standards for the Remedial Action are being met. Guidances used in developing the Sampling and Analysis Plan during the Remedial Design phase shall be used. The Performance Standards Verification Plan shall be submitted with the RA Work Plan. Once approved, the Performance Standards Verification Plan shall be implemented on the approved schedule. The Performance Standards Verification Plan consists of two parts:

1. The Performance Standards Verification Field Sampling and Analysis Plan that provides guidance for all fieldwork by defining in detail the sampling and data gathering methods to be used on a project. The Verification Field Sampling and Analysis Plan shall be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required.

2. The Performance Standards Verification Quality Assurance/Quality Control plan that describes the policy, organization, functional activities, and quality assurance and quality control protocols necessary to achieve the performance standards set forth in the Record of Decision and the Remedial Design plans and specifications.

B. Five Year Review

Because the selected remedy will leave residual levels of hazardous constituents on-site, EPA shall conduct a Five Year Review to ensure that the remedy has reached the goal of being protective of human health and the environment. The time period for the five year review shall start on the day of the Preconstruction Meeting.

C. Remedy Completion Report

Settling Defendants shall submit the Remedy Completion Report in accordance with Paragraph 48.a of the Consent Decree.

REFERENCES

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RD/RA process:

1. "National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule", Federal Register 40 CFR Part 300, March 8, 1990.
2. "Superfund Remedial Design and Remedial Action Guidance", U.S. EPA, Office of Emergency and Remedial Response, June 1986, OSWER Directive No. 9355.0-4A.
3. "Interim Final Guidance on Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties", U.S. EPA, Office of Emergency and Remedial Response, February 14, 1990, OSWER Directive No. 9355.5-01.
4. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final", U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01.
5. "A Compendium of Superfund Field Operations Methods", Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.
6. "EPA NEIC Policies and Procedures Manual", EPA-330/9-78-001-R, May 1978, revised November 1984.
7. "Data Quality Objectives for Remedial Response Activities", U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.
8. "Guidelines and Specifications for Preparing Quality Assurance Project Plans", U.S. EPA, Office of Research and Development, Cincinnati, OH, QAMS-004/80, December 29, 1980.
9. "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans", U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.

10. "Users Guide to the EPA Contract Laboratory Program", U.S. EPA, Sample Management Office, August 1982.
11. "Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual", U.S. EPA Region IV, Environmental Services Division, February 1, 1991.
12. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis", U.S. EPA, Office of Emergency and Remedial Response, February 1988.
13. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis", U.S. EPA, Office of Emergency and Remedial Response, July 1988.
14. "Quality in the Constructed Project: A Guideline for Owners, Designers, and Constructors, Volume 1, Preliminary Edition for Trial Use and Comment", American Society of Civil Engineers, May 1988.
15. "Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements", U.S. EPA, Office of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.
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22. "Standards for the Construction Industry", Federal Register 29 CFR 1926, Occupational Health and Safety Administration.

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25. "TLVs - Threshold Limit Values and Biological Exposure Indices for 1991-92", American Conference of Governmental Industrial Hygienists.
26. "American National Standards Practices for Respiratory Protection", American National Standards Institute Z88.2-1980, March 11, 1981.
27. "Procedures for Completion and Deletion of NPL Sites", U.S. EPA, Office of Emergency and Remedial Response, April 1989, OSWER Directive No. 9320.2-3A.

SUMMARY OF THE MAJOR DELIVERABLES FOR THE
REMEDIAL DESIGN AND REMEDIAL ACTION AT
THE MEDLEY FARM SITE

	<u>DELIVERABLE</u>	<u>EPA RESPONSE</u>
<u>TASK I</u>	<u>SCOPING</u>	
	Technical Memorandum Documenting Any Revised Site Objectives (5)	Review and Approve
	Field Sampling and Analysis Plan (12)	Review and Approve
	Health and Safety Plan (5)	Review and Comment
	Treatability Study Work Plan (12)	Review and Approve
	Treatability Study Evaluation Report (10)	Review and Approve
<u>TASK II</u>	<u>REMEDIAL DESIGN</u>	
	RD Work Plan (12)	Review and Approve
	Sampling and Analysis Plan (12)	Review and Approve
	Preliminary Design	
	Results of Data Acquisition Activities (12)	Review and Approve
	Design Criteria Report (12)	Review and Approve
	Preliminary Plans and Specifications (10)	Review and Approve
	Plan for Satisfying Permit Requirements (10)	Review and Approve
	Draft Construction Schedule (10)	Review and Comment
	Prefinal/Final Design	
	Complete Design Analyses (10)	Review and Approve
	Complete Plans and	Review and Approve

Specifications (10)

Final Construction Schedule (10) Review and Approve

Construction Cost Estimate (5) Review and Comment

TASK III REMEDIAL ACTION

RA Work Plan (12) Review and Approve

Project Delivery Strategy (10) Review and Approve

Construction Management Plan (10) Review and Approve

Construction Quality Assurance
Plan (10) Review and Approve

Construction Health and Safety
Plan/Contingency Plan (5) Review and Comment

Prefinal Inspection Report (5) Review and Comment

Remedial Action Report (10) Review and Approve

TASK IV OPERATION AND MAINTENANCE

Operation and Maintenance Plan (12) Review and Approve

TASK V PERFORMANCE MONITORING

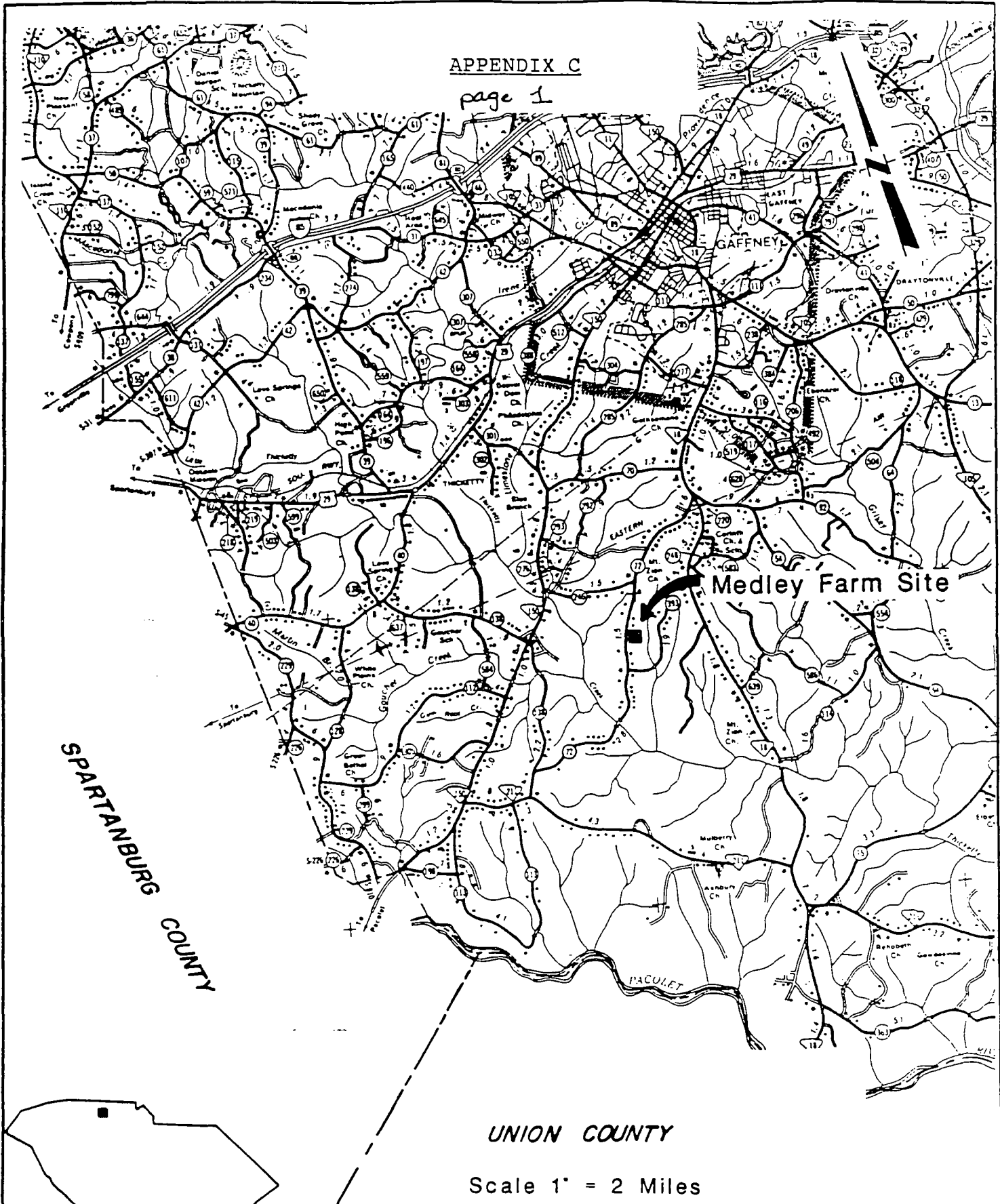
Performance Standards Verification
Plan (12) Review and Approve

Remedy Completion Report (12) Review and Approve

Note: The number in parenthesis indicates the number of copies to be submitted by Respondents. One copy shall be unbound, the remainder shall be bound.

APPENDIX C

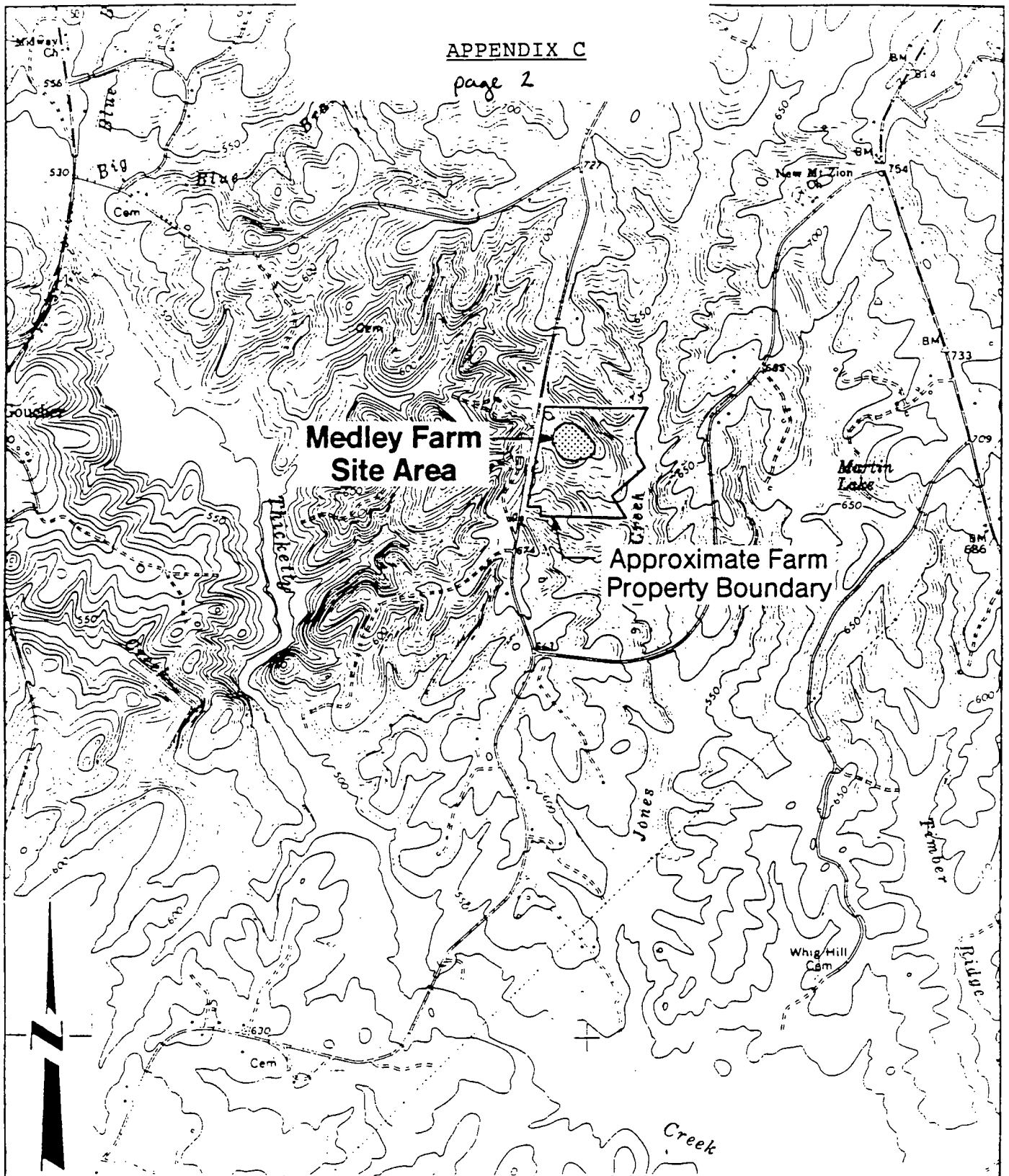
page 1



Greenville, South Carolina

Figure 2.2
Medley Farm Site
Cherokee County
Gaffney, South Carolina

Map showing location
of site and county in
South Carolina.



USGS Pacolet Mills Quadrangle

Scale 1:24,000

Figure 2.3
Approximate Boundaries of
Medley Farm Site and Farm Property

Medley Farm Site Gaffney, South Carolina

SIRRINE
 ENVIRONMENTAL
 CONSULTANTS

APPENDIX D

1. Milliken & Company
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4. BASF Corporation
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5. Evode-Tanner Industries, Inc.
P.O. Box 1967
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6. Ethox Chemicals, Inc.
P.O. Box 5094
Greenville, SC 29606
7. Colonial Heights Packaging Inc.
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